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TM 676A

INSTRUCTION MANUAL

TEST MESSAGE GENERATOR

TMG-10

November 1976

ATLANTIC RESEARCH CORPORATION
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ALEXANDRIA, VIRGINIA 22314

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TEST MESSAGE GENERATOR

TMG-10

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TABLE OF CONTENTS

Section		Page
I	GENERAL DESCRIPTION	1
II	INSTALLATION	5
	2-1 Preoperational Checks	5
	2-2 Procedure for Removing TMG-10 from Case	5
	2-3 Procedure for Use with 230-Volt and/or 50-Hz Power Source	6
	2-4 Procedure for Setting EIA/MIL Output	6
	2-5 Procedure for Setting OS-2 Signal Output Polarity	6
	2-6 Procedure for Setting OS-2 Loop Current Output	7
	2-7 Procedure for Programming Block Parity Character	8
III	OPERATION	11
	3-1 Panel Functions	11
	3-2 Operating Procedure for Internally Controlled FOX Messages	16
	3-3 Operating Procedure for Other Internally Controlled Messages	18
	3-4 Operating Procedure for External Clock Speed Control with Distortion Control	18
	3-5 Operating Procedure for External Synchronizing Speed Control of Undistorted Messages	19
	3-6 Longitudinal Redundancy Check	19
	3-7 Operating Procedure for "Exercising" IBM 1050-Class Equipment	19
IV	THEORY OF OPERATION	21
V	MAINTENANCE	23
	5-1 Maintenance	23
	5-2 Fuse and Lamp Replacement	23
	5-3 CS-4 Speed Substitution and Crystal Replacement	23
VI	DRAWINGS	29

LIST OF ILLUSTRATIONS

Figure		Page
1-1	Test Message Generator TMG-10	v
4-1	Simplified Functional Block Diagram of the TMG-10	22
TP-FA-41834676	Final Assembly, TMG-10	31
TP-SD-41898688	Schematic Diagram, Clock Source Module CS-4	35
TP-AD-41899688	Assembly, P.C. Board, Clock Source Module CS-4	37
TP-SD-41808676	Schematic Diagram, Bit Counter Module BC-1	39
TP-AD-41810676	Assembly, P.C. Board, Bit Counter Module BC-1	41
TP-SD-41817676	Schematic Diagram, Character Counter Module CC-2	43
TP-AD-41819676	Assembly, P.C. Board, Character Counter Module CC-2	45
TP-SD-41837676	Schematic Diagram, Fixed Message Module FM-3	47
TP-AD-41835676	Assembly, P.C. Board, Fixed Message Module FM-3	49
TP-SD-41814676	Schematic Diagram, Distortion Gating Module DG-2	51
TP-AD-41816676	Assembly, P.C. Board, Distortion Gating Module DG-2	53
TP-SD-41823676	Schematic Diagram, Distortion Marks Generator Module DM-2	55

LIST OF ILLUSTRATIONS (Cont'd)

Figure		Page
TP-AD-41825676	Assembly, P.C. Board, Distortion Marks Generator Module DM-2	57
TP-SD-41826676	Schematic Diagram, Power Supply-Mother Board Module PS-MB	59
TP-AD-41828676	Assembly, P.C. Board, Power Supply-Mother Board Module PS-MB	61
TP-SD-42632802	Schematic Diagram, Option Subassembly Module OS-2	63
TP-AD-42633802	Assembly, P.C. Board, Option Subassembly Module OS-2	65

LIST OF TABLES

Table		Page
1-1	Specifications, TMG-10	2
1-2	Transmission Speeds of Various Clock Source Modules	4
2-1	Power Supply-Mother Board PS-MB Jumper-Clip Settings	7
2-2	Block Parity Character Bit Configuration Chart	9
2-3	Block Parity Character, Sample Calculations for "AC" Station Identification Code with Odd Vertical Parity and Even Horizontal Parity	9
3-1	TMG-10 Front-Panel Controls and Indicators	11
3-2	TMG-10 Rear-Panel Controls	14
3-3	TMG-10 Jacks	15
3-4	Teleprinter Code Charts	17
5-1	CS-4 Crystal Frequencies and Strapping for Standard Signal Speeds	24
5-2	Crystal Selection Chart	26

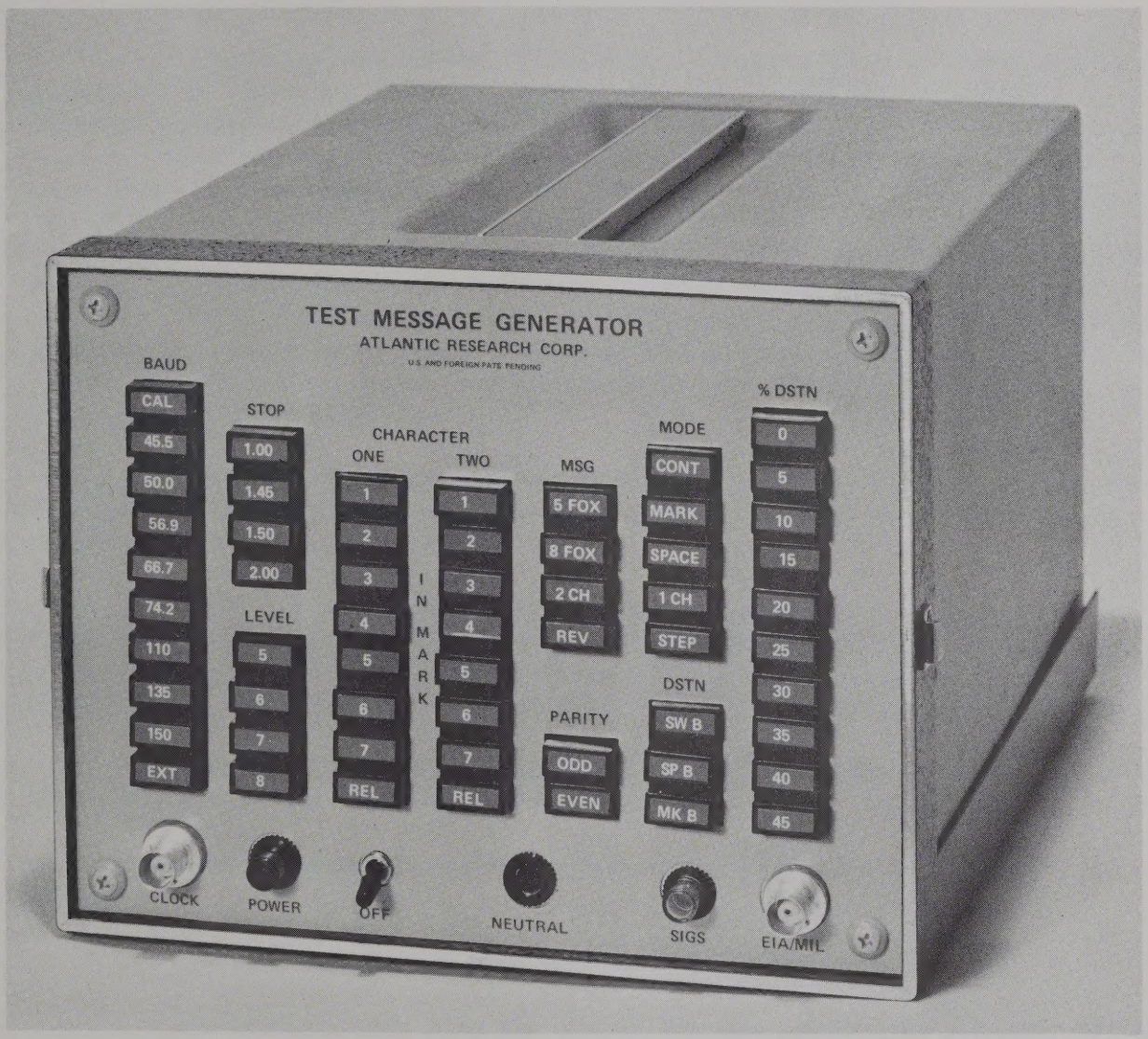


Figure 1-1. Test Message Generator TMG-10.

SECTION I

GENERAL DESCRIPTION

The Test Message Generator TMG-10 is a precision instrument for test-center or field use in testing telegraph and data transmission facilities and associated equipment. The TMG-10 generates test messages into which controlled distortion may be introduced. Distortion is variable in 5-percent increments between zero and 45 percent and may be marking bias, spacing bias, or switched bias. Each TMG-10 can contain up to two fixed test messages up to 128 characters long which are factory-programmed and a manually-programmable 2-character message. In addition the TMG-10 can transmit reversals with controlled distortion, steady spacing, or steady marking signals. Independent pushbutton switches enable any of the messages to be transmitted at any selected speed and with any selected stop element. The messages may be transmitted continuously or one character at a time. Either of the two programmable characters may be released independently. Up to nine discrete transmission speeds may be controlled by the internal clock (transmission speeds up to 50,000 baud), or an external synchronizing signal, such as obtained from a laboratory precision oscillator, may be used for additional transmission speeds up to 1,000,000 baud.

The TMG-10 contains a parity generator which is controlled from the panel to insert automatically the proper parity bit for either even or odd parity in the 7- and 8-level messages. If parity is not desired, the parity bit may be forced to either mark or space.

Standard output modes, available at front-panel jacks, are: isolated dry neutral keying (for open loop voltages up to 260 volts with protection from inductive spikes) and low-level polar voltage (EIA or MIL-188). Optional outputs available on the back panel are wet polar, wet neutral, logic level signals, and clock signal for synchronizing terminal equipment with the TMG-10. Table 1-1 gives complete specifications for the TMG-10.

The TMG-10 and a companion analyzer fit side-by-side into an MR-14 rack adapter in a standard 19-inch relay rack and occupy only 7 inches of vertical mounting space.

In addition to the normal in-service testing of transmission facilities and equipment, the TMG-10 may be used to:

Exercise I/O devices, using the optional 96-character 7-level factory-programmed message.

Check polling functions, using the standard front-panel programmable characters and the single-character release feature.

Verify operation of parity check circuits.

Check 7-level longitudinal redundancy (or "block parity"). Validity of instrument-generated block parity character may be controlled using the front-panel 2-character pushbuttons. Any bit of the longitudinal check may be forced invalid.

Adjust bias in carrier channels using transmitted distorted reversals.

Identify the transmitting station to the receiving test center. The 2-character programmable message is automatically inserted into the fixed-message transmission in the space reserved for station identification.

Table 1-1. Specifications, TMG-10.

Signal Outputs	
Standard	Dry neutral, isolated nonpolarized solid-state dry-contact keying for up to 100-milliampere neutral loops at 260 volts (maximum) open loop voltage. Protection is provided for highly inductive loops. Maximum marking drop (at 100 milliamperes) is 2 volts. Low-level polar voltage, either EIA or MIL-STD-188 as determined by internal jumper-clip strap. Source impedance is 180 ohms.
Optional (requires OS-2 module)	Logic level, +4 volts (source impedance 680 ohms) and ground (sinking capability 20 milliamperes). Marking sense is controlled by jumper-clip strap. Wet neutral or wet polar, controlled by rear-panel switch and potentiometer. Regulated current output $\leqslant$0.6 milliampere per 100-ohm change in loop resistance, adjustable from 10 to 65 milliamperes.
Transmission Speed	
Standard (with CS-4-1)	45.5, 50.0, 56.9, 66.666,[a] 74.2, 110, 134.49,[b] 150 and 2,400 baud. Each speed is controlled by a high-stability crystal oscillator. Accuracy $\pm$0.01 percent.
Optional	37.5-50,000 baud up to nine discrete speed selections. Each speed is controlled by a high-stability crystal oscillator. Accuracy $\pm$0.01 percent. (See Table 1-2.)
Externally Controlled	Up to 50,000 baud with controlled distortion. CLOCK jack allows speed control by external oscillator operating at a frequency in Hz of 20 times the signal speed in baud, 4 volts sinusoidal (rms) or pulses (positive peak) into 6,000 ohms. Up to 1,000,000 baud undistorted. EXT SYNC jack on rear panel accepts externally generated clock for synchronizing the TMG internally-generated signal. External oscillator must operate at a frequency in Hz equal to the signal speed in baud, 3 volts (nominal) positive pulses into 225 ohms.
Code Level	5-, 6-, 7-, and 8-level start-stop.

[a]Marked on panel 66.7.
[b]Marked on panel 134.5.

Table 1-1. Specifications, TMG-10. (Cont'd)

Stop Element	Four discrete stop element selections: 1.00, 1.45, 1.50, and 2.00, selected by pushbuttons on front panel.
Messages	Two fixed-program messages (up to 128 coded characters). Standard messages are 5-level fox and 8-level fox. Seven-level exerciser message and other messages available on special order. Manually-programmable message of two characters. The two characters are incorporated into each fixed-message transmission as sending station identification. The two-character message also may be transmitted independently. Fixed or manually programmable messages may be transmitted continuously or stepped one character at a time.
	Reversals
	Mark hold
	Space hold
Distortion Capability	Zero to 45 percent, adjustable in 5-percent increments. Accuracy ± 0.25 percent.
	Marking bias, spacing bias, and switched bias
Synchronizing Output (requires OS-2 module)	INT CLOCK jack on rear panel provides pulses from the instrument clock for synchronizing external equipment. Pulses are at twice signal speed (i.e., have a frequency in Hz equal to the signal speed in baud).
Power Requirements	115 or 230 volts ac ± 10 percent, 50-60 Hz, 50 watts
Size	9 1/2 (wide) by 6 5/8 (high) by 12 (deep) inches, including handle
Weight	10 1/4 pounds
Temperature	0 to 55°C
Rack Mounting	Mounts in half of 19- by 7-inch MR-14 mounting rack adapter (A companion analyzer may be mounted in other half of rack adapter.)

Table 1-2. Transmission Speeds of Various Clock Source Modules.

CS-4-1 (Std.):	45.5, 50.0, 56.9, 66.666,[a] 74.2, 110, 134.49,[b] 150, and 2,400 baud
CS-4-2:	110, 134.49,[b] 150, 600, 1,200, 2,400, 4,800, 9,600, and 50,000 baud
CS-4-3:	45.5, 50.0, 75.0, 80.0, 82.5, 96.0, 100, 200, and 300 baud
Speeds available for special modules	37.5, 45.5, 50.0, 52.5, 55.7, 56.9, 61.1, 66.7, 67.5, 73.3, 74.2, 75.0, 80.0, 82.0, 82.5, 84.9, 91.0, 93.8, 96.0, 100, 110, 112.5, 120, 133.2, 134.49,[a] 134.5, 135, 140.6, 150, 187.5, 192, 200, 300, 600, 1,050, 1,200, 2,000, 2,250, 2,400, 3,600, 4,800, 9,600, 18,000, 19,200, 24,000, 28,000, 40,800, 48,000, and 50,000 baud.

[a]Marked on panel 66.7.
[b]Marked on panel 134.5

SECTION II

INSTALLATION

The Test Message Generators TMG-10 are delivered ready for use. However, it is advisable to perform the following preoperational checks before initial use of the instrument and to perform the indicated procedures if applicable.

2-1. Preoperational Checks. The TMG-10 is set at the factory to operate from a 115-volt 60-Hz ac power source. If the instrument is to be used with a 230-volt or 50-Hz power source, follow the procedure of Paragraph 2-3. If the instrument is to be used with a 115-volt ac power source, check that the slide switch located on the rear panel below the fuse is set to expose the number 115.

Check that the rear panel SYNC switch is set on INT (unless the instrument is to be used with an external synchronizing clock source as described in Paragraph 3-5).

The instrument is shipped from the factory set to generate EIA signals. If MIL-188 signals are desired, follow the procedure of Paragraph 2-4.

Instruments equipped with the option subassembly OS-2 module are shipped from the factory set for 60-milliampere wet neutral or negative-marking polar output. For positive-marking polar output, follow the procedure of Paragraph 2-5. If some other value of loop current is desired, follow the procedure of Paragraph 2-6. Check that the POLAR/WET NEUTRAL switch on the rear panel is set to the desired mode of operation.

Instruments which contain a 7-level exerciser message (as indicated by an MSG switch on the front panel labeled 7 FOX) are shipped from the factory with the block parity character programmed to check longitudinal redundancy only if the 2-character station identification code to be used with the message was furnished to the factory at time of order. All other instruments are programmed for an all-marking block parity character. The procedure for programming the block parity character is given in Paragraph 2-7.

If an output signal shaping capacitor is desired for MIL-188 signals, mounting space is provided on the power supply-mother board PS-MB module. Refer to the schematic and printed circuit board assembly drawings in Section VI for the location of the capacitor mounting space.

2-2. Procedure for Removing TMG-10 from Case. Do not attempt to remove the TMG-10 from its case unless required by an applicable procedure. Many of the preoperational procedures may be performed without removing the instrument from its case.

WARNING

Unless required by a test procedure, do not plug the instrument into the ac power supply while the cover is off.

a. Remove the four screws located on the rear of the instrument which fasten the top and side cover piece to the chassis.

b. Slide the top and side cover piece back and up to remove it from the instrument. For most adjustments and preoperational checks, the removal of the cover is all the disassembly that is required and steps c through f may be omitted.

c. If it is necessary to remove a printed-circuit module (Paragraph 2-7), perform the following operations. Remove the exposed screws from the front panel.

d. Remove the gray front-panel overlay.

e. Remove the two screws located on the front panel at the top and bottom of the printed-circuit module which is to be removed. Refer to the final assembly drawing in Section VI for the locations of the printed-circuit modules.

f. Rock the printed-circuit module out of its connector and lift up and back to get it out of the case. Note that the front-panel switches are part of the printed-circuit module.

g. Replace the complete instrument in its case when preoperational checks are completed.

2-3. Procedure for Use with 230-Volt and/or 50-Hz Power Source. If the instrument is to be powered from a 230-volt ac power source, set the slide switch located on the rear panel below the fuse so as to expose the number 230.

2-4. Procedure for Setting EIA/MIL Output. To set the EIA/MIL front-panel output, remove the instrument cover (Paragraph 2-2) and position the jumper clip located on the power supply-mother board PS-MB module to bridge the desired signal output type. Instruments are shipped from the factory with the jumper clip set in the EIA– position. Refer to the PS-MB printed circuit board assembly drawing in Section VI for the location of the jumper clip. Setting the jumper clip to EIA– produces a negative-marking EIA signal at the EIA/MIL output. Setting the jumper clip to MIL+ produces a 6-volt positive-marking MIL-188 signal at the EIA/MIL output.

NOTE

If the instrument contains an OS-2 module, refer to Paragraph 2-5 before completing this procedure.

2-5. Procedure for Setting OS-2 Signal Output Polarity. This procedure applies only to instruments containing an option subassembly OS-2 module (as indicated by LOOP OUT, LOGIC OUT, and INT CLOCK jacks on the rear panel). The same EIA–/MIL+ jumper clip referenced in Paragraph 2-4, and located on the power supply-mother board PS-MB module, is used to control the wet neutral, wet polar, and logic signal output polarities. The instrument is shipped from the factory with the jumper clip set in the EIA– position. Table 2-1 gives the output signals associated with each jumper-clip setting.

NOTE

It is not possible to control the polarities independently, nor is it desirable to change the jumper-clip setting often. If a conflict in signal output requirements exists, a permanent setting should be chosen which will meet the majority of the test signal requirements.

Table 2-1. Power Supply-Mother Board PS-MB Jumper-Clip Settings.

Setting	Signal Outputs	Output Jack
EIA–	Negative-marking EIA	Front-panel EIA/MIL jack
	Negative-marking wet polar	Rear-panel LOOP OUT jack, if POLAR/WET NEUTRAL switch is in POLAR position
	Normal (open-circuit spacing) wet neutral	Rear-panel LOOP OUT jack, if POLAR/WET NEUTRAL switch is in WET NEUTRAL position
	Positive-marking unipolar logic	Rear-panel LOGIC OUT jack
MIL+	Positive-marking MIL-188	Front-panel EIA/MIL jack
	Positive-marking wet polar	Rear-panel LOOP OUT jack, if POLAR/WET NEUTRAL switch is in POLAR position
	Inverted (open-circuit marking) wet neutral	Rear-panel LOOP OUT jack, if POLAR/WET NEUTRAL switch is in WET NEUTRAL position
	Positive-spacing unipolar logic	Rear-panel LOGIC OUT jack

2-6. Procedure for Setting OS-2 Loop Current Output. This procedure applies only to instruments containing an option subassembly OS-2 module (as indicated by LOOP OUT, LOGIC OUT, and INT CLOCK jacks on the rear panel). Note the current output may be adjusted without removing the instrument case. This output was factory-set at 60 milliamperes, nominal. If some other value of polar or neutral loop current is desired, use the following procedure to adjust the regulated current output.

a. Plug the ac power cord into an appropriate ac outlet and turn the power switch on.

b. Set the rear-panel POLAR/WET NEUTRAL switch to WET NEUTRAL. (This procedure is used to adjust either polar or neutral output current.)

c. Push the front-panel MODE switch labeled MARK.

d. Plug a milliammeter (100-mA full-scale) into the LOOP OUT jack, using a standard telephone plug with tip connected to the negative terminal of the milliammeter.

e. Use a screwdriver to adjust the LOOP ADJUST potentiometer so that the milliammeter reads the desired loop current.

f. Unplug the ac power cord.

g. Set the rear-panel POLAR/WET NEUTRAL switch to the desired signal output.

2-7. Procedure for Programming Block Parity Character. This procedure applies only to instruments containing a 7-level exerciser message (as indicated by a front-panel MSG switch labeled 7 FOX). The block parity character which will produce a valid longitudinal redundancy check at the end of each fox message depends upon the text of the 7-level fox message. The test is fixed except for the two characters programmed on the front panel, which are transmitted as the first two characters (station identification code) of the 7-level message. To program the block parity check character, use the following procedure.

a. Record the bit configurations for the first six bits of the two station-identification code characters in the appropriate space in Table 2-2. Refer to Table 3-4 for the 7-level IBM code chart. Table 2-3 is an example of this procedure, filled out for the station identification letters ac.

b. Determine and record the proper vertical parity bit (7th bit) for each of the two characters. (The TMG-10 automatically inserts the proper parity during the message transmission. Even parity, odd parity, or seventh bit marking or spacing may be selected for transmission by the appropriate switches on the front panel.) In Table 2-2, duplicate only the parity bit that is to be transmitted with the message for characters 1 and 2. Table 2-3 illustrates odd vertical parity.

c. To determine the block parity character, start with bit 1 and record in the proper column (odd or even horizontal parity) a mark or a space, depending on what is required to supplement the three bits already recorded for bits 1 of characters 1, 2, and net. Continue similarly for bits 2 through 7. Note that the block parity bit 7 is determined by the 7th bits of characters 1, 2, and net. Bit 7 of the block parity character is not a vertical parity bit. Table 2-3 illustrates even horizontal (block) parity.

NOTE

Do not program the block parity character as all spaces. HK and IL are illegal station identification codes for odd block parity. IJ is an illegal station identification code for even block parity.

d. Remove the TMG-10 cover (Paragraph 2-2). It is recommended that the character counter CC-2 module be removed from the assembly (Paragraph 2-2). Refer to the final assembly drawing in Section VI for the location of the CC-2 module.

WARNING

Be sure that the TMG-10 is disconnected from the power source before removing modules from the assembly.

e. Set the jumper clips on the CC-2 module to the positions determined in step c. Refer to the CC-2 printed circuit board assembly drawing in Section VI for jumper clip locations. Note that bit 1 is the jumper clip on the right end of the row and should be programmed up for mark (1—M and down for space (1—S).

f. Reinstall the CC-2 module in the assembly.

Table 2-2. Block Parity Character Bit Configuration Chart.

Bit No.	Character No. 1 (step a)	Character No. 2 (step a)	Net of Fixed 7-Level Message	Block Parity Character Required (step c)	
				Odd Horizontal Parity	Even Horizontal Parity
1			S		
2			M		
3			M		
4			S		
5			S		
6			S		
7, odd vertical parity (step b)			S		
7, even vertical parity (step b)			S		

Table 2-3. Block Parity Character, Sample Calculations for "AC" Station Identification Code with Odd Vertical Parity and Even Horizontal Parity.

Bit No.	Character No. 1 = A (step a)	Character No. 2 = C (step a)	Net of Fixed 7-Level Message	Block Parity Character Required (step c)	
				Odd Horizontal Parity	Even Horizontal Parity
1	M	M	S		S
2	M	M	M		M
3	S	S	M		M
4	S	S	S		S
5	S	M	S		M
6	M	M	S		S
7, odd vertical parity (step b)	S	M	S		M
7, even vertical parity (step b)			S		

SECTION III

OPERATION

3-1. Panel Functions. Table 3-1 lists the front-panel controls and indicators used in the operation of the TMG-10. Table 3-2 lists the rear-panel controls. Table 3-3 lists the input and output jack functions.

Table 3-1. TMG-10 Front-Panel Controls and Indicators.

Control or Indicator	Position	Function
BAUD mechanically interlocked switch bank		
	Numeral	When pushed, sets TMG-10 to operate at indicated speed in baud. Note that any message can be transmitted at any of the available speeds.
	EXT	When pushed, sets TMG-10 to operate from external speed control clock source which must be plugged into CLOCK jack.
STOP mechanically interlocked switch bank	--	When pushed, inserts stop element of indicated bit length at the end of each character of message selected by MSG switch.
LEVEL mechanically interlocked switch bank	--	When pushed, sets TMG-10 to operate at indicated code level. Note that level switch selected must agree with code level of message selected by MSG switch.
CHARACTER ONE independent switch bank	1 through 7 (latching)	When pushed, sets indicated bit of first programmable character for marking. When not pushed, sets indicated bit of first programmable character for spacing.
	REL (momentary)	When pushed, causes single transmission of first programmable character if 2 CH MSG switch and 1 CH MODE switch are selected.
CHARACTER TWO independent switch bank	1 through 7 (latching)	When pushed, sets indicated bit of second programmable character for marking. When not pushed, sets indicated bit of second programmable character for spacing.

Table 3-1. TMG-10 Front-Panel Controls and Indicators. (Cont'd)

Control or Indicator	Position	Function
CHARACTER TWO independent switch bank (cont'd)	REL (momentary)	When pushed, causes single transmission of second programmable character if 2 CH MSG switch and 1 CH MODE switch are selected.
MSG mechanically interlocked switch bank. (There are only two FOX switches on each instrument.)	5 FOX, 6 FOX, or 8 FOX	When pushed, selects message of indicated code level. Message will read: "THE QUICK BROWN FOX....XX (as programmed on the CHARACTER switches). Note that LEVEL switch must be selected to agree with message code level and that mode of transmission is selected by MODE switch.
	7 FOX	When pushed, selects 7-level exerciser message. Message will read: "XX (as programmed on the CHARACTER switches) THE QUICK BROWN FOX..." ending with an end-of-block character, the block parity character (Paragraph 2-7), and a 29-character pause. Note that the 7 LEVEL switch must be selected and that mode of transmission is selected by MODE switch.
	2 CH	When pushed, selects 2-character message programmed on CHARACTER switches. Note that LEVEL switch must be selected to agree with message code and that mode of transmission is selected by MODE switch.
	REV	When pushed, selects reversals which will be transmitted continuously except when MARK or SPACE MODE switch is selected.
PARITY mechanically interlocked switches		The PARITY switch selection has no effect on 5- or 6-level messages.
	ODD	When pushed, sets TMG-10 to insert odd parity bit automatically at the end of each 7- or 8-level character.
	EVEN	When pushed, sets TMG-10 to insert even parity bit automatically at the end of each 7- or 8-level character.
	Both ODD and EVEN	When pushed, sets TMG-10 to transmit marking parity bit automatically at the end of each 7- or 8-level character. When released, sets TMG-10 to transmit spacing parity bit automatically at the end of each 7- or 8-level character. NOTE To override the mechanical interlock, both switches must be pushed simultaneously. To release both switches, push in and then push to release.

Table 3-1. TMG-10 Front-Panel Controls and Indicators. (Cont'd)

Control or Indicator	Position	Function
MODE mechanically interlocked switch bank	CONT	Causes message selected to be transmitted continuously at all outputs.
	MARK	Sets all outputs to mark hold regardless of message selected. Note the SIGS lamp is off for marking.
	SPACE	Sets all outputs to space hold regardless of message selected. Note the SIGS lamp is on for spacing.
	1CH	Sets all outputs to mark hold and allows transmission of single characters. If a FOX MSG switch is selected, the message will be transmitted one character (in sequence from the selected message) each time the STEP MODE switch is pushed. If the 2 CH MSG switch is selected, either one of the two characters programmed on the CHARACTER switches will be transmitted each time the appropriate REL switch is pushed.
MODE independent switch	STEP	Causes transmission of single character if 1 CH MODE and FOX MSG switches are selected. The STEP switch has no effect unless the 1 CH MODE switch is selected. The STEP switch has no effect if the 2 CH MSG switch is selected.
DSTN mechanically interlocked switch bank		Controls type of distortion. Amount of distortion is set on % DSTN switches.
	SW B	Introduces switched bias distortion, marking and spacing bias alternating with each character, in selected message.
	SP B	Introduces spacing bias distortion in every character of selected message.
	MK B	Introduces marking bias distortion in every character of selected message.
% DSTN mechanically interlocked switch bank	--	Introduces distortion of indicated percentage into selected message. Type of distortion is set on DSTN switches.
Red POWER indicator lamp	Unlighted	Internal power supply is off.

Table 3-1. TMG-10 Front-Panel Controls and Indicators. (Cont'd)

Control or Indicator	Position	Function
Red POWER indicator lamp (cont'd)	Lighted, with BAUD numerical or EXT switch selected	Internal power supply is on.
OFF toggle switch	Up	Connects internal dc power supply to ac power source.
	Down	Disconnects internal dc power supply from ac power source.
White SIGS indicator lamp	Lighted	Indicates that transmission drive to outputs is spacing.
	Unlighted	Indicates that transmission drive to outputs is marking.
	Blinking	Indicates that lamp is following signal containing both mark and space bits.

Table 3-2. TMG-10 Rear-Panel Controls.

Control or Indicator	Position	Function
SYNC slide switch	INT	Sets TMG-10 transmission speed to be controlled by front-panel BAUD switches.
	EXT	Sets TMG-10 to accept transmission speed control from externally generated clock source plugged into SYNC jack.
Voltage input slide switch	115	Sets internal dc power supply to operate from 115-V ac input.
	230	Sets internal dc power supply to operate from 230-V ac input.
LOOP ADJUST potentiometer (only if unit contains option subassembly OS-2 module)	--	Controls wet neutral and polar output current.

Table 3-2. TMG-10 Rear-Panel Controls. (Cont'd)

Control or Indicator	Position	Function
POLAR/WET NEUTRAL (only if unit contains option subassembly OS-2 module)	POLAR	Sets LOOP OUT output for polar signals
	WET NEUTRAL	Sets LOOP OUT output for wet neutral signals

Table 3-3. TMG-10 Jacks.

Jack	Location	Used for
CLOCK BNC connector	Front Panel	Input from external oscillator for external control of signal speed up to 50,000 baud. External oscillator must operate at a frequency in Hz of 20 times the desired signal speed in baud and supply 4 volts sinusoidal (rms) or pulses (positive peak) into 600 ohms. Any internal message may be transmitted with internally controlled distortion.
NEUTRAL 1/4-inch telephone jack	Front Panel	Output test signal for nonpolarized solid-state dry-contact keying of neutral loop. Loop current should not exceed 100 milliamperes. External battery of not more than 260 volts is required in loop.
EIA/MIL BNC connector	Front Panel	Output test signal for driving EIA or MIL-188 circuits. Output signal is negative for marking and positive for spacing (6 volts) if internal jumper clip is set for EIA. Output signal is positive for marking and negative for spacing (6 volts) if internal jumper clip is set for MIL.
SYNC BNC connector	Rear Panel	If SYNC slide switch is in EXT position, input from external oscillator for external control of signal speed up to 1,000,000 baud. External oscillator must operate at a frequency in Hz equal to the desired signal speed in baud and supply 3 volts (nominal) positive pulses into 225 ohms. Any internal message may be transmitted synchronized to the negative-going oscillator transitions.
LOOP OUT 1/4-inch telephone jack (only if unit contains option subassembly OS-2 module)	Rear Panel	Output test signal for driving neutral or polar loops. Signal type is determined by setting of POLAR/WET NEUTRAL switch. Regulated output current, controlled by LOOP ADJUST potentiometer, is adjustable from 10 to 65 milliamperes.
LOGIC OUT BNC connector (only if unit contains option subassembly OS-2 module)	Rear Panel	Logic level output, +4 volts and ground. Marking sense is controlled by internal EIA/MIL jumper clip.

Table 3-3. TMG-10 Jacks. (Cont'd)

Jack	Location	Used for
INT CLOCK BNC connector (only if unit contains option subassembly OS-2 module)	Rear Panel	Output signal from the internal clock for synchronizing external equipment. Signal is ±6-volt pulses at twice signal speed (i.e., a frequency in Hz equal to the signal speed in baud).

3-2. Operating Procedure for Internally Controlled FOX Messages. To use the TMG-10 to provide fox-message signals for testing telegraph or data transmission equipment, use the following procedure.

a. Plug the ac power cord into an appropriate ac outlet and turn the power switch on. Check that the red POWER indicator lamp is lighted.

b. Check that the rear-panel SYNC switch is on INT.

c. Select (push) the BAUD, STOP, LEVEL, and FOX MSG switches to produce the desired signal speed, stop element length, code level, and message.

NOTE

If the desired signal speed is not available on the BAUD switches, use the procedure of Paragraph 3-4 or 3-5 for external speed control.

d. Program the two CHARACTER switch banks for the desired transmission. Refer to Table 3-4 for the various code charts and push the switches which correspond to marking bits. The two characters will be transmitted as the station identification code of the selected FOX message.

NOTE

Do not program either of the two characters to be all spacing bits. An all spacing character is recognized by the TMG-10 as an end of message condition.

NOTE

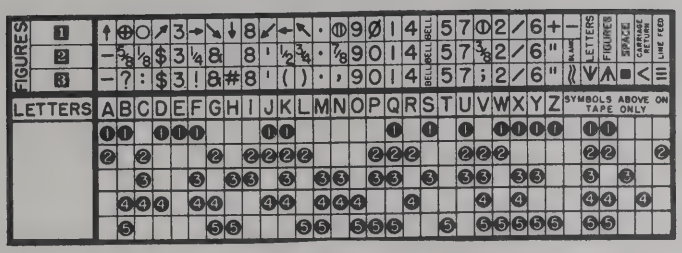
The positions of the switches corresponding to unused bits (i.e., bits 6 and 7 in 5-level code) have no effect on the signal transmission.

e. Select the CONT MODE switch. Select the PARITY, DSTN, and % DSTN switches to produce the desired parity, type of distortion, and amount of distortion.

f. If the option subassembly LOOP OUT wet neutral or polar output is to be used, check that the POLAR/WET NEUTRAL switch is in the appropriate position and that regulated current output is set for the desired value (Paragraph 2-6).

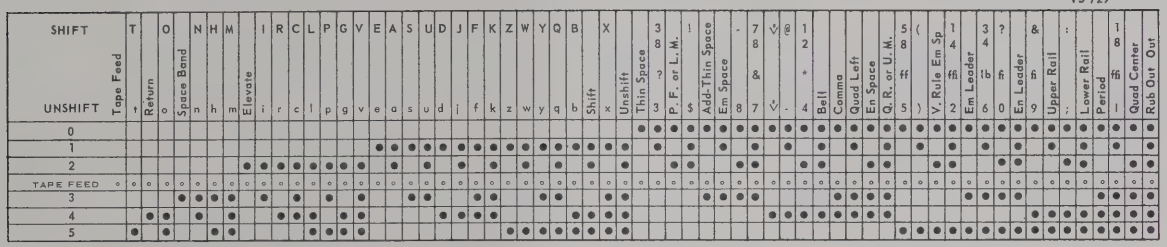
Table 3-4. Teleprinter Code Charts.

FIVE-LEVEL BAUDOT

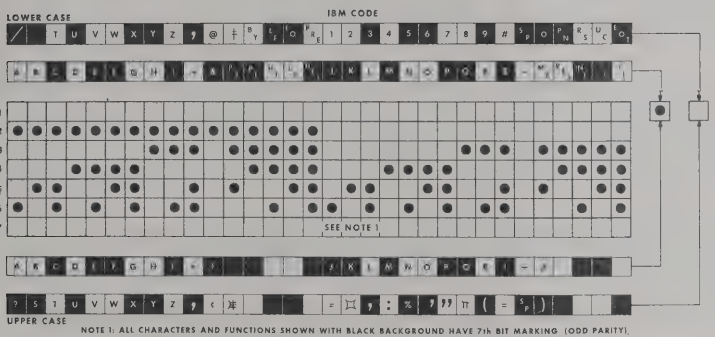


SIX-LEVEL CODE CHART

TS 729

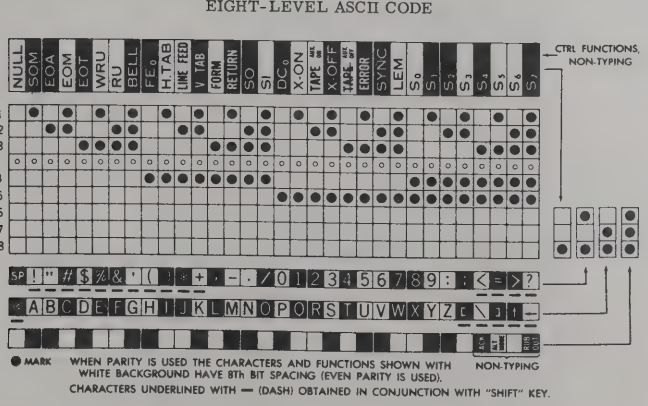


IBM CODE



NOTE 1: ALL CHARACTERS AND FUNCTIONS SHOWN WITH BLACK BACKGROUND HAVE 7th BIT MARKING (ODD PARITY).

EIGHT-LEVEL ASCII CODE



● MARK WHEN PARITY IS USED THE CHARACTERS AND FUNCTIONS SHOWN WITH WHITE BACKGROUND HAVE 8th BIT SPACING (EVEN PARITY IS USED).

CHARACTERS UNDERLINED WITH — (DASH) OBTAINED IN CONJUNCTION WITH "SHIFT" KEY.

g. Connect the circuit(s) under test to the appropriate output(s).

3-3. Operating Procedure for Other Internally Controlled Messages. To use the TMG-10 to provide any of the other internally controlled messages, follow the procedure of Paragraph 3-2, with the following exceptions.

Two-Character Message. To transmit any two characters alternating continuously,

a. Program the two CHARACTER switch banks for the desired transmission (as in step d of Paragraph 3-2).

b. Select (push) the 2 CH MSG switch. Check that the proper BAUD, STOP, LEVEL, PARITY, MODE (CONT), DSTN, and % DSTN switches are selected.

Mark-Hold or Space-Hold. To stop the continuous message transmission and set the outputs to mark or space, push the MARK MODE or the SPACE MODE switch. The previously selected message will be resumed only when the CONT MODE switch is selected.

Single Character Transmission. To transmit a message, one character at a time.

a. Select the 1 CH MODE switch. Check that the proper BAUD, STOP, LEVEL, CHARACTER, MSG, PARITY, DSTN, and % DSTN switches are selected.

b. If a FOX MSG switch is selected, push the STEP MODE switch each time a character transmission is desired. If the 2 CH MSG switch is selected, push the REL switch located below the programmed character to be transmitted.

Reversals. To transmit reversals, select the REV MSG switch. Check that the proper BAUD, MODE (CONT), DSTN and % DSTN switches are selected.

3-4. Operating Procedure for External Clock Speed Control with Distortion Control. If the desired signal speed is not available on the BAUD switches, a clock source may be provided by a standard laboratory signal generator. The output of the signal generator may be sinusoidal (3 to 15 volts rms) or positive peak pulses (4 to 20 volts).

NOTE

This procedure can be used only for signal speeds up to 50,000 baud. For higher signal speeds refer to Paragraph 3-5.

a. Select the EXT BAUD switch.

b. Patch the signal generator into the front-panel CLOCK jack.

c. Adjust the signal generator for a frequency (in Hz) 20 times the desired signal speed (in baud).

d. Otherwise follow the procedure of Paragraph 3-2.

3-5. Operating Procedure for External Synchronizing Speed Control of Undistorted Messages. For signal speeds up to 1,000,000 baud, speed control may be provided by an external synchronizing oscillator. The output of the external oscillator must be 3-volt (nominal) positive pulses. Instrument output signal will be synchronized with the negative-going oscillator transitions.

a. Set the rear-panel INT/EXT switch to EXT. This overrides any selection made on the BAUD switch bank.

b. Patch the signal generator into the rear-panel SYNC jack.

c. Adjust the signal generator for a frequency (in Hz) equal to the desired signal speed (in baud).

d. Select the desired LEVEL, CHARACTER, MSG, and PARITY switches. In the STOP switch bank, select either 1.00 or 2.00. Push the CONT MSG and 0 % DSTN switches.

e. Connect the circuit(s) under test to the appropriate output(s).

f. If desired during a test, the MARK or SPACE MODE switch or the REV MSG switch may be selected. Do not select the 1 CH MODE switch.

3-6. Longitudinal Redundancy Check.

NOTE

This procedure applies only to the 7 FOX exerciser message.

The block parity character for longitudinal redundancy check is programmed in the TMG-10 based upon two specific station identification code characters (Paragraph 2-7). To force the block parity character invalid, and check that the receiving machine detects the invalid longitudinal redundancy, reverse the setting of any single CHARACTER bit switch.

3-7. Operating Procedure for "Exercising" IBM 1050-Class Equipment.

NOTE

This procedure applies only to the 7 FOX exerciser message.

To use the TMG-10 to exercise IBM 1050 equipment, use the following procedure.

a. Plug the ac power cord into an appropriate ac outlet and turn the power switch on. Check that the red power indicator lamp is lighted.

b. Check that the rear-panel sync switch is on INT.

c. Select (push) the following front-panel switches:

134.5 BAUD

1.00 STOP

7 LEVEL

Bits 3, 4, 5, and 6 of CHARACTER ONE switch bank (Bits 1 and 2 should be out). This programs EOT into CHARACTER ONE.

2 CH MSG

ODD PARITY

1 CH MODE

DSTN and % DSTN as required

d. Connect the circuit under test to the appropriate output.

e. Push the REL CHARACTER ONE switch.

f. Reset the two CHARACTER switch banks. Refer to Table 3-4 for code chart.

Set CHARACTER ONE for the "address all stations" code.

Set CHARACTER TWO for the digit representing equipment to be exercised. (1 = printer 1; 2 = printer 2; 3 = punch 1; 4 = punch 2; 5 = keyboard; 6 = reader 1; 7 = reader 2; 9 = all output units; 0 = all input units)

NOTE

Equipment having automatic timeout or disconnect features may drop off the line unless steps g through l are performed in rapid succession.

g. Push the REL CHARACTER ONE switch.

h. Push the REL CHARACTER TWO switch.

i. Reset the CHARACTER ONE switch bank for EOA (bits 3, 5, and 6 in for mark; bits 1, 2, and 4 out for space).

j. Push the REL CHARACTER ONE switch.

k. Reset the two CHARACTER switch banks for the station identification code letters.

l. Select the 7 FOX MSG and the CONT MODE switches. The instrument is now transmitting a continuous 7-level test message.

m. To stop the test and shut off the 1050 equipment, select the 1 CH MODE and 2 CH MSG switches. Reset the CHARACTER ONE switch bank for EOT (bits 3, 4, 5, and 6 in for mark; bits 1 and 2 out for space). Push the REL CHARACTER ONE switch.

SECTION IV

THEORY OF OPERATION

The Test Message Generator TMG-10 is a self-contained instrument whose internal dc power supply requires only standard (115- or 230-volt) ac input. Digital solid-state logic is used throughout. Because it is recommended that the instrument be returned to the factory for repair or maintenance, the following discussion of the instrument operation will be limited to continuous transmission of a fox message with internal speed control.

Figure 4-1 is a simplified block diagram of the TMG-10. Complete schematic and printed circuit board assembly drawings of the TMG-10 modules are included in Section VI.

The clock source module (CS-4) generates a highly accurate timing signal at a frequency (in Hz) of 20 times the signal speed (in baud) at which the TMG-10 is operating. The clock signal is fed to the distortion marks generator module (DM-2). The DM-2 generates distortion reference marks occurring in 5-percent increments of the baud period. The appropriate pair of reference marks, as selected by the % DSTN switch bank, is fed to the distortion gating module (DG-2). The DM-2 also generates a double-speed signal (i.e., frequency in Hz is equal to signal speed in baud). This UP signal and an inverted DOWN signal are used for reference timing throughout the instrument.

The UP signal is used to step the bit counter (on the bit counter module BC-1). The bit counter output is used to shift the scanner through the parallel data lines (bit lines) from the fixed message module (FM-3). This converts the parallel data to a serial bit stream. Loading of the characters (parallel data) into the converter is controlled by the character counter module (CC-2). Advance of the character count is controlled by the system reset pulse generated by the BC-1 module at the beginning of each character.

The undistorted serial bit stream from the BC-1 is fed (through the MSG switch bank) to the DG-2 module where the selected distortion is introduced into the signal (as controlled by the distortion reference marks from the DM-2).

The output of the DG-2 module is fed to the power supply-mother board module (PS-MB) where it is processed and delivered to the front-panel output jacks. For units containing an option subassembly (OS-2), the mother board module supplies a logic level distorted signal to the OS-2 module which contains the current regulator for wet neutral and polar signals and the output driver for logic signals.

Not shown on the block diagram, the parity bit generator (for 7- and 8-level signals) is located on the DG-2 module. Both even and odd parity is generated for each character and fed to the PARITY switches on the FM-3 module. The selected parity bit is fed to the BC-1 module for insertion in the undistorted message.

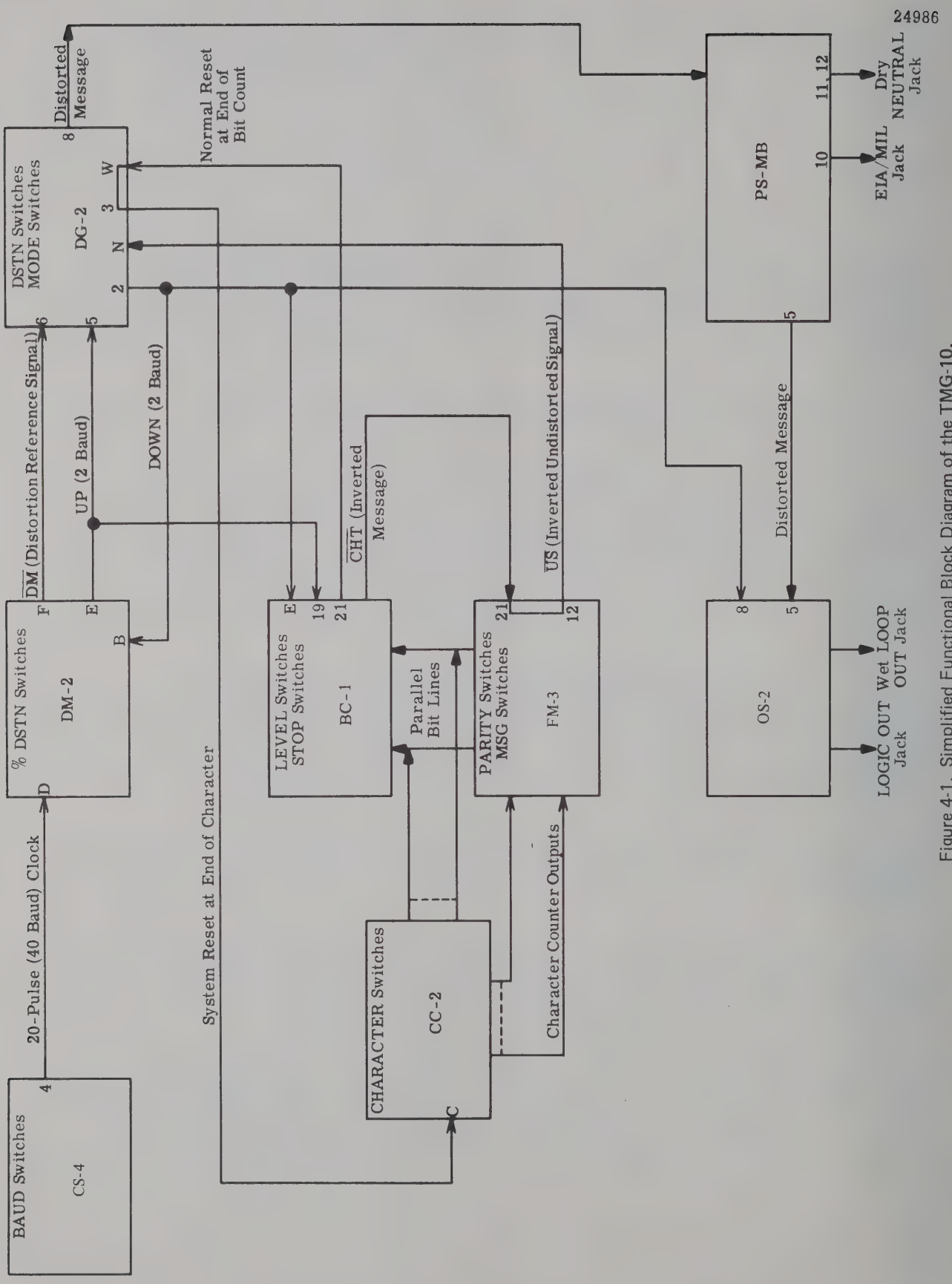


Figure 4-1. Simplified Functional Block Diagram of the TMG-10.

SECTION V

MAINTENANCE

5-1. Maintenance. No routine maintenance is required for the TMG-10.

Procedure for checking loop current output on units containing the option subassembly OS-2 module is given in Paragraph 2-6.

5-2. Fuse and Lamp Replacement. The fuse is located on the rear panel. For 115-volt operation use 1/2-ampere slow-blow replacement fuse; for 230-volt operation use 1/4-ampere slow-blow replacement fuse. The two indicator lamps are located on the front panel. Replacement lamps should be General Electric No. 387, or equivalent.

5-3. CS-4 Speed Substitution and Crystal Replacement. Instruments equipped with the crystal-controlled clock source CS-4 module are shipped from the factory ready for operation at any of the speeds indicated on the front panel switches.

To substitute a crystal to provide a new transmission speed capability, first determine the crystal required for the desired speed. For guaranteed operation and speed accuracy, order the crystal from Atlantic Research Corporation.

Crystal Selection. If the desired speed is one of the standard speeds listed in Table 5-1, read the crystal frequency required and strap required from the chart. If the desired speed is not one of the standard speeds, calculate the required crystal frequency, using the following procedure.

a. From Table 5-2, read the "multiplier" which applies to the speed range within which the desired speed lies. (Where two speed ranges overlap, there will be two acceptable crystal frequencies with different installation strapping requirements.)

b. Multiply the desired speed (in baud) by the "multiplier" from step a to obtain crystal frequency in Hz.

Table 5-1. CS-4 Crystal Frequencies and Strapping for Standard Signal Speeds.

Speed (baud)	Crystal Frequency Required (Hz)	Strap(s) Required
37.5	240,000	64
44.5	284,950	64
45.5483 (45.5)	291,509	64
50.0	320,000	64
52.5	336,000	64
55.7	356,480	64
56.8546 (56.9)	363,869	64
61.1	391,040	64
66.7	426,666	64
67.5	432,000	64
73.3	469,120	64
74.268 (74.2)	475,052	64
75.0	480,000	64
80.0	256,000	32
82.0	262,400	32
82.5	264,000	32
84.9	271,680	32
91.0	291,200	32
93.8	300,160	32
96.0	307,200	32
100.0	320,000	32
110.0	352,000	32
112.5	360,000	32
120.0	384,000	32
133.2	426,240	32

Table 5-1. CS-4 Crystal Frequencies and Strapping for Standard Signal Speeds. (Cont'd)

Speed (baud)	Crystal Frequency Required (Hz)	Strap(s) Required
134.49	430,368	32
134.5	430,400	32
135.0	432,000	32
140.6	449,920	32
150.0	480,000	32
187.5	300,000	16
192.0	307,200	16
200.0	320,000	16
300.0	480,000	16
600.0	480,000	8
1,050.0	420,000	4
1,200.0	480,000	4
2,000.0	800,000	4
2,250.0	900,000	4
2,400.0	960,000	4
3,600.0	720,000	2
4,800.0	960,000	2
9,600.0	960,000	1
18,000.0	360,000	1 and J[a]
19,200.0	384,000	1 and J[a]
24,000.0	480,000	1 and J[a]
28,000.0	560,000	1 and J[a]
40,800.0	816,000	1 and J[a]
48,000.0	960,000	1 and J[a]
50,000.0	1,000,000	1 and J[a]

[a]See step e of Installation Instructions

Table 5-2. Crystal Selection Chart.

Speed Range (baud)	Multiply Speed by	Use Strap(s)
30-78	6,400	64
60-156	3,200	32
120-312	1,600	16
240-625	800	8
480-2,500	400	4
960-5,000	200	2
1,920-10,000	100	1
10,000-50,000	20	1 and J[a]

[a]See step e of Installation Instructions.

c. Note the strap requirement, for use during the installation procedure.

For example: The crystal selected for a transmission speed of 2,000 baud should be either 800,000 Hz (2,000 X 400) with strap 4 required, 400,000 Hz (2,000 X 200) with strap 2 required, or 200,000 (2,000 X 100) with strap 1 required.

Crystal Installation. Install the new crystal in the TMG-10, using the following procedure.

a. Consult the CS-4 schematic and printed circuit board assembly drawings (in Section VI of this manual) and decide which BAUD switch is to be used for the new speed.

b. Remove the TMG-10 from its case (Paragraph 2-2, steps a and b). If strap changes are required remove the CS-4 module from the instrument (Paragraph 2-2, steps c through f).

c. Install the new crystal in the proper position. Note crystal position 1 corresponds to the top BAUD switch and strapping terminal A.

d. Check the strapping between the lettered terminal corresponding to the switch position and the numbered terminal. If the strapping is not that which was determined in step c of the crystal selection procedure, remove the existing strap and install the proper new wire strap. Record the new strapping on the CS-4 schematic diagram in Section VI. Check that none of the existing wire straps are disconnected by the new installation. Reconnect disconnected straps if necessary.

e. If the new signal speed is above 10,000 baud, also install an insulated wire strap between terminal J (located just above the switch bank) and pin 2 of the proper BAUD switch.

f. Remount the CS-4 module and return the TMG-10 to its case.

g. Record the new speed in the proper switch position on the TMG-10 front panel.

5-4. Repair. Only factory repair is recommended for the TMG-10.

SECTION VI

DRAWINGS

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	EXT/INT SWITCH WAS TOGGLE TYPE DCN #799	1-5-70	P.E.S.	[illegible]	AO
B	ADDED ITEM 22 & 23. DELETED NOTE 2. EN #991	9-8-70	PES	WK#	AO
C	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE	[illegible]	[illegible]
D	CHANGED OS-1 TO OS-2. ADDED NOTE 4. EN 2452	3-25-74	AJH	PES	[illegible]

(1) OR (19) REF

(3) 4 PLCS

(25) REF

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER
23	P.C. BOARD ASSEMBLY CS-4 (SEE NOTE 1)		ARC
22	COVER ASSEMBLY, COV-1-1		ARC
21	LABELS, SWITCH, TP-31378676-2		DURALITH
20	LABELS, SWITCH, TP-31378676-1		DURALITH
19	CHASSIS ASSEMBLY		ARC
18	CABINET, OPTIMA, TP-41830676		SCIENTIFIC ATLANTA
17	SCREW,DECORATIVE,#6-32NC-2 X 1/2 LG,SS,PH.HD.		STAKE FASTENER CO.
16	FRONT PANEL OVERLAY, TP-41802676		DURALITH
15	NUT,CAP, HEX, ACORN, N/P BRASS,#6-32NC-2		
14	WASHER, LOCK,#6, SS, SPLIT		
13	SCREW, PAN HD,#6-32NC-2 X 3/16 LG.,SS		
12	P.C. BOARD ASSEMBLY, DM-2		ARC
11	P.C. BOARD ASSEMBLY, DG-2		ARC
10	P.C. BOARD ASSEMBLY, FM-3		ARC
9	SWITCH, HARNESS ASSEMBLY		ARC
8	P.C. BOARD ASSEMBLY, CC-2		ARC
7	P.C. BOARD ASSEMBLY, BC-1		ARC
6			ARC
5	P.C. BOARD ASSEMBLY, PS-MB		ARC
4	SCREW,FLAT HD,#4-40NC-2 X 1/4 LG., SS		
3	SCREW,FLAT HD,#6-32NC-2 X 3/16 LG., SS		
2	FRONT PANEL ASSEMBLY		ARC
1	CHASSIS ASSEMBLY		ARC

LIST OF MATERIALS OR PARTS LIST

NOTES:

1. OPTION CS-4 OR CS-3, CS
3. OPTION SUBASSEMBLY, OS- ONLY WITH TP-FA-4183467 OS-2 SUPERSEDES OS-1.
4. WIRING UPDATE REQUIRED FOR TMG-10, SERIAL NUM

PECIFIED CHES.

AWING

APPROVAL	BY	DATE
DRAWN	E. Vinson	5/19/69
CHECKED	WK#	6/24/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19

APPROVED
NAME DATE 19

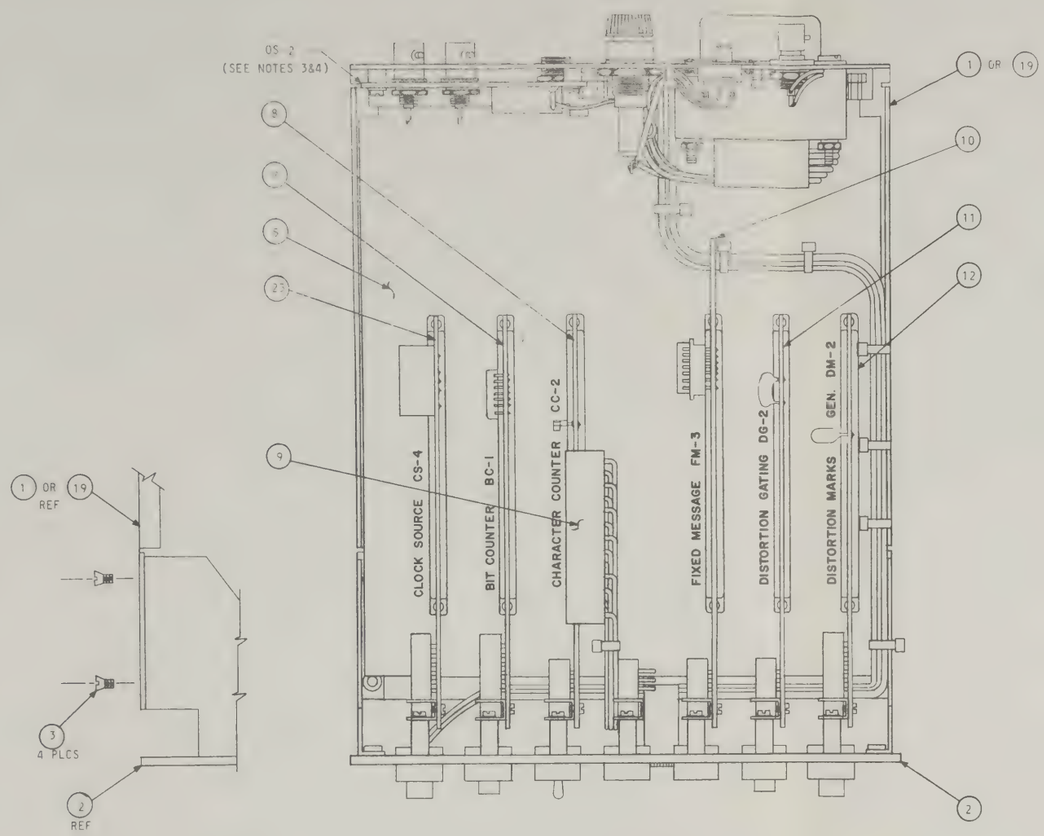
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

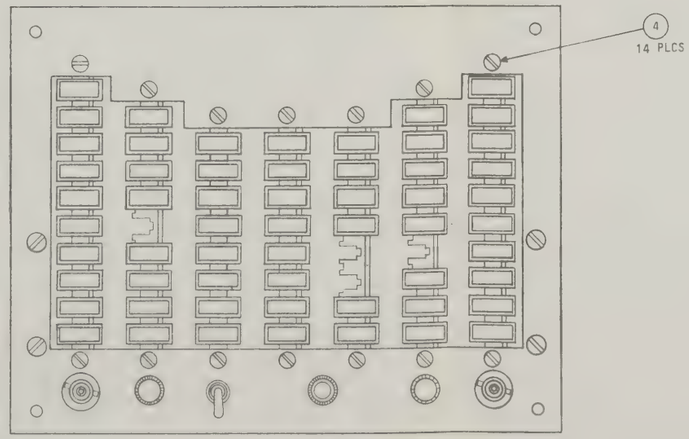
FINAL ASSEMBLY
TMG-10
SERIES "B"

CODE IDENT NO.	SIZE		REV
95335	D	TP-FA-41834676	D LTR

SCALE 1/1 SHEET 1 OF 2

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	EXT/INT SWITCH WAS TOGGLE TYPE DCN #799	4-5-70	PES	[illegible]	AG
B	ADDED ITEM 22 & 23. DELETED NOTE 2. EN#991	9-8-70	PES	[illegible]	AG
C	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE	[illegible]	[illegible]
D	CHANGED OS-1 TO OS-2. ADDED NOTE 4. EN 2452	3-25-74	AJH	[illegible]	[illegible]





NOTES:

1. OPTION CS-4 OR CS-3, CS-4 SHOWN TYPICAL.

3. OPTION SUBASSEMBLY, OS-2, IS SUPPLIED ONLY WITH TP-FA-41834676-2. OS-2 SUPERSEDES OS-1

4. WIRING UPDATE REQUIRED FOR EXTERNAL SYNC FOR TMG-10, SERIAL NUMBER SERIES "A"

QTY	REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER
1	1	TP-AD-41899688	23	P.C. BOARD ASSEMBLY CS-4 (SEE NOTE 1)		ARC
1	1	TP-FA-31386705	22	COVER ASSEMBLY, COV-1-1		ARC
1	1	33485	21	LABELS, SWITCH, TP-31378676-2		DURALITH
1	1	33484	20	LABELS, SWITCH, TP-31378676-1		DURALITH
1	—	TP-SA-41832676-2	19	CHASSIS ASSEMBLY		ARC
1	1	34475	18	CABINET, OPTIMA, TP-41830676		SCIENTIFIC ATLANTA
4	4	33697	17	SCREW,DECORATIVE,#6-32NC-2 X 1/2 LG,SS,PH.HD.		STAKE FASTENER CO.
1	1	33487	16	FRONT PANEL OVERLAY, TP-41802676		DURALITH
2	2	33717	15	NUT,CAP, HEX, ACORN, N/P BRASS,#6-32NC-2		
6	6		14	WASHER, LOCK, #6, SS, SPLIT		
4	4		13	SCREW, PAN HD, #6-32NC-2 X 3/16 LG., SS		
1	1	TP-AD-41826676	12	P.C. BOARD ASSEMBLY, DM-2		ARC
1	1	TP-AD-41816676	11	P.C. BOARD ASSEMBLY, DG-2		ARC
1	1	TP-AD-41835676	10	P.C. BOARD ASSEMBLY, FM-3		ARC
1	1	TP-AD-31377676	9	SWITCH, HARNESS ASSEMBLY		ARC
1	1	TP-AD-41819676	8	P.C. BOARD ASSEMBLY, CC-2		ARC
1	1	TP-AD-41810676	7	P.C. BOARD ASSEMBLY, BC-1		ARC
			6			ARC
1	1	TP-AD-41828676	5	P.C. BOARD ASSEMBLY, PS-MB		ARC
14	14		4	SCREW, FLAT HD, #6-32NC-2 X 7/16 LG., SS		
4	4		3	SCREW, FLAT HD, #6-32NC-2 X 3/16 LG., SS		
1	1	TP-SA-41833676	2	FRONT PANEL ASSEMBLY		ARC
—	1	TP-SA-41832676-1	1	CHASSIS ASSEMBLY		ARC
-2	-1					

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS
DO NOT SCALE DRAWING
MATERIAL

APPROVAL	BY	DATE
DRAWN	E. Simon	5/19/69
CHECKED	[illegible]	[illegible]
ENGRG	[illegible]	[illegible]
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH — NAME — DATE — 19

APPROVED — NAME — DATE — 19

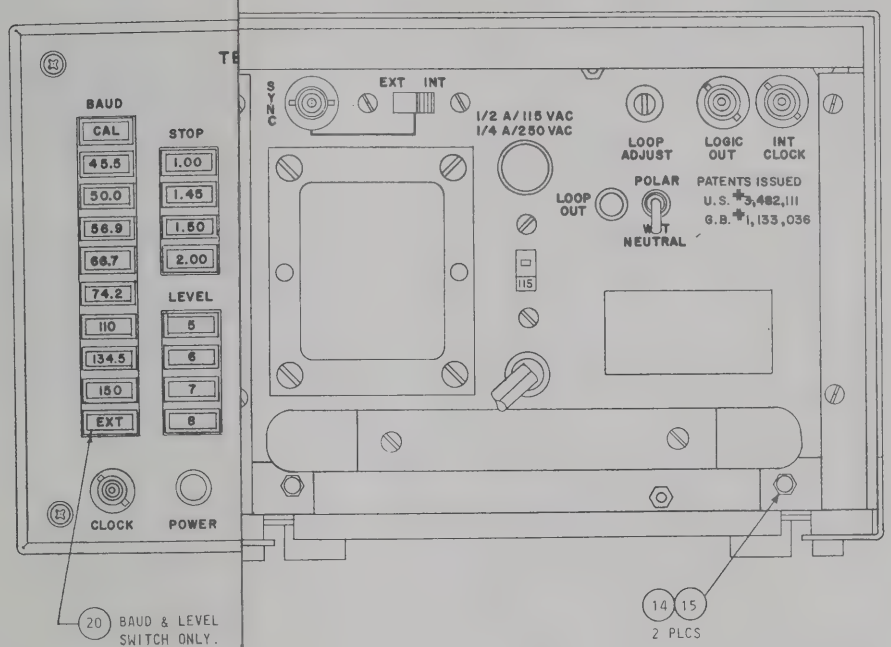
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

FINAL ASSEMBLY
TMG-10
SERIES "B"

CODE IDENT NO.	SIZE		REV
95335	D	TP-FA-41834676	D LTR
SCALE 1/1		SHEET 1 OF 2	

DASH NO	NEXT ASSEMBLY	PROJECT
APPLICATION		

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD



BAUD VALUES SH
TYPICAL. CLOCK
CS-3-1 SHOWN F
REFERENCE.

FOR PARTS LIST SEE SHEET 1 OF 2

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

APPROVAL	BY	DATE
DRAWN	E.D. Lemon	5/19/69
CHECKED	[illegible]	6/24/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME _____ DATE _____ 19__

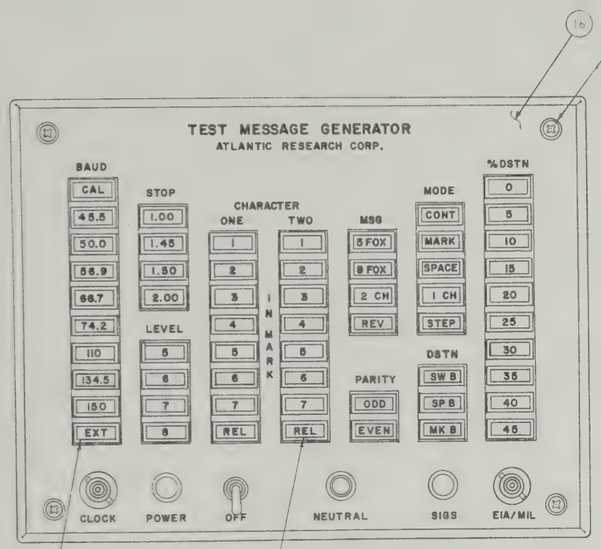
APPROVED
NAME _____ DATE _____ 19__

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

FINAL ASSEMBLY
TMG-10
SERIES "B"

CODE IDENT NO.	SIZE		REV
95335	D	TP-FA-41834676	D LTR
SCALE 1/1		SHEET 2 OF 2	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD

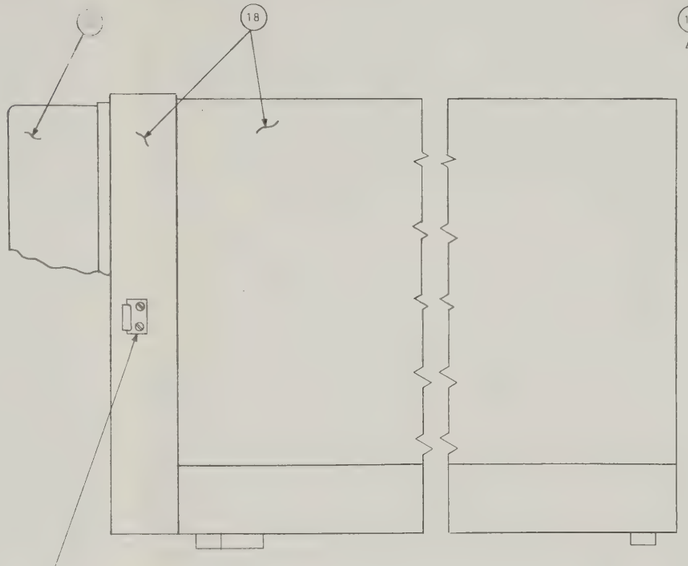


16 17 4 PLCS

20 BAUD & LEVEL SWITCH ONLY.

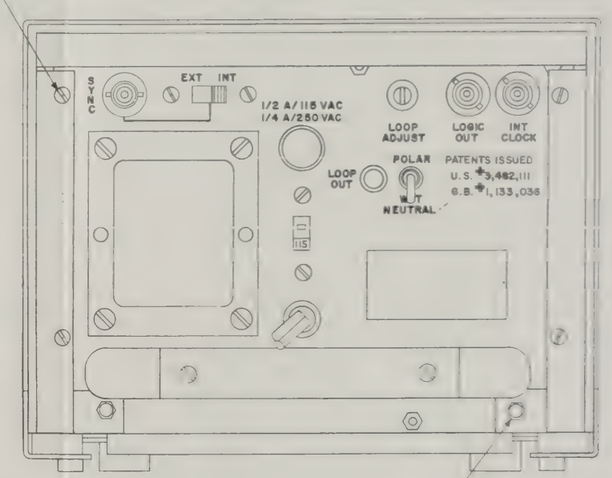
21 ALL SWITCHES EXCEPT BAUD & LEVEL.

BAUD VALUES SHOWN ARE TYPICAL. CLOCK SOURCE CS-3-1 SHOWN FOR REFERENCE.



18

POSITION CLIP AS SHOWN (HARDWARE AND CLIP SUPPLIED WITH ITEM 22)



13 14 4 PLCS

15 16 2 PLCS

FOR PARTS LIST SEE SHEET 1 OF 2

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS

DO NOT SCALE DRAWING

MATERIAL:

APPROVAL	BY	DATE
DRAWN	[illegible]	5/19/67
CHECKED	[illegible]	[illegible]
ENGRG	[illegible]	[illegible]
PROJ ENGRG	[illegible]	11-14-67
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

FINAL ASSEMBLY
TMG-10
SERIES "B"

DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

CODE IDENT NO.	SIZE		REV
95335	D	TP-FA-41834676	D LTR
SCALE 1/1		SHEET 2 OF 2	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED S1J SECTION B2. EN 1007	5-20-70	PS	WCH	AQ
B	Q2 WAS 2N3646; CS-4-2, Y4 WAS 240. EN 1105A	7-20-70	EV	WCH	AQ
C	ADDED NOTES 4 & 5. EN 1171	9-21-70	EV	WCH	AQ
D	Z1 WAS 790, R7 WAS 1K. EN 2530	6-17-74	ALE	PEL	WCH

CRYSTAL SELECTION CHARTS

TMG-10/DQA-10

BAUD RANGE	MULTIPLIER	STRAP
30 - 78	6,400	64
60 - 156	3,200	32
120 - 312	1,600	16
240 - 625	800	8
480 - 2.5K	400	4

TMG-10 ONLY

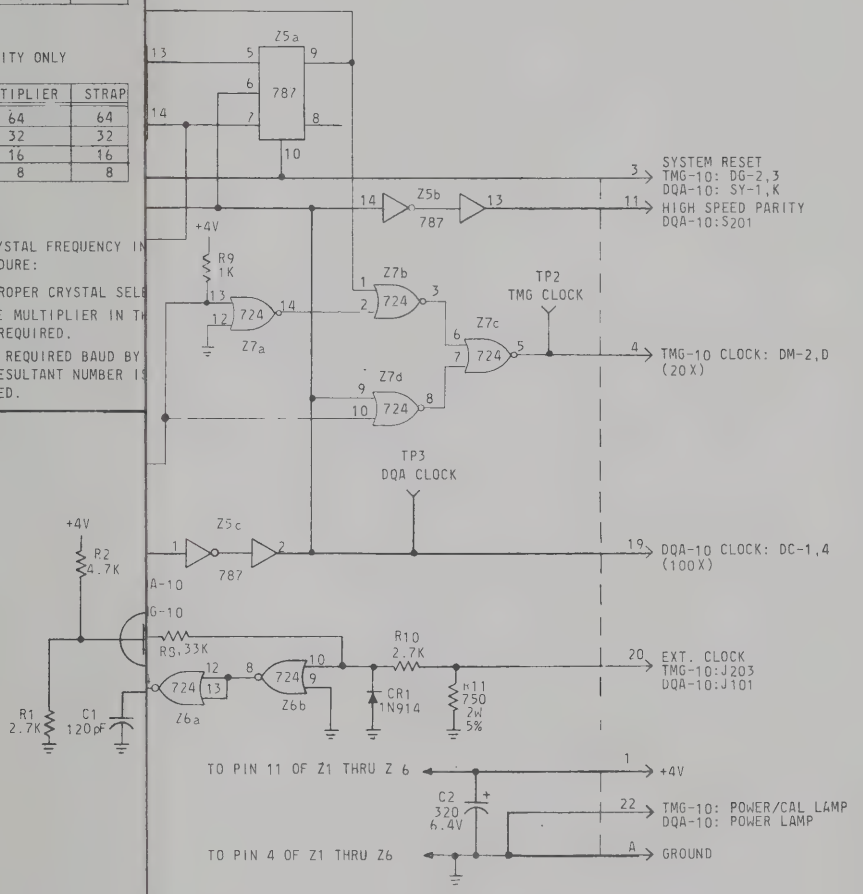
BAUD RANGE	MULTIPLIER	STRAP
960 - 5K	200	2
1.92K - 10K	100	1
10K - 50K	20	1

DQA-10 PARITY ONLY

BAUD RANGE	MULTIPLIER	STRAP
2.5K - 7.5K	64	64
7K - 15K	32	32
14K - 30K	16	16
28K - 60K	8	8

TO DETERMINE THE CRYSTAL FREQUENCY IN
THE FOLLOWING PROCEDURE:

1. SELECT THE PROPER CRYSTAL SELE
2. DETERMINE THE MULTIPLIER IN TH
   OF THE BAUD REQUIRED.
3. MULTIPLY THE REQUIRED BAUD BY
   ABOVE. THE RESULTANT NUMBER IS
   IN Hz REQUIRED.



NOTES:

1. UNLESS OTHERWISE
   A. ALL CAPACI
   B. ALL RESIST
2. TERMINAL "J" IS
   THE TMG-10 ONLY.
3. STRAPPING SHOWN
4. S1 IS MECHANICALL
   IN THE ENERGIZED
5. CRYSTALS SHALL BE
   RESEARCH CORP. DF

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

CIFIED	APPROVAL	BY	DATE
	DRAWN	E.P. Timbers	7/26/69
	CHECKED	S. Jobs	2/16/70
	ENGRG	W.H. Ding	2/16/70
	PROJ ENGRG	[illegible]	2/16/70
	STRESS		
N			
ING	APPROVED FOR ATLANTIC RESEARCH	NAME	DATE 19
	APPROVED	NAME	DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DIVISION
ALEXANDRIA, VIRGINIA

SCHEMATIC DIAGRAM
CLOCK SOURCE
CS-4

SERIES "A"

CODE IDENT NO.	SIZE		REV
95335	D	LTP-SD-41898688	D LTR
SCALE NONE			SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED S1J SECTION B2. EN 1007	5-20-70	PS		
B	Q2 WAS 2N3646; CS-4-2, Y4 WAS 240. EN 1105A	7-20-70	EV		
C	ADDED NOTES 4 & 5. EN 1171	9-21-70	EV		
D	Z1 WAS 790, R7 WAS 1K. EN 2530	6-17-74	ALE		

CRYSTAL SELECTION CHARTS

TMG-10/DQA-10

BAUD RANGE	MULTIPLIER	STRAP
30 - 78	6,400	64
60 - 156	3,200	32
120 - 312	1,600	16
240 - 625	800	8
480 - 2.5K	400	4

TMG-10 ONLY

BAUD RANGE	MULTIPLIER	STRAP
960 - 5K	200	2
1.92K - 10K	100	1
10K - 50K	20	1

*SEE NOTE 2

DQA-10 PARITY ONLY

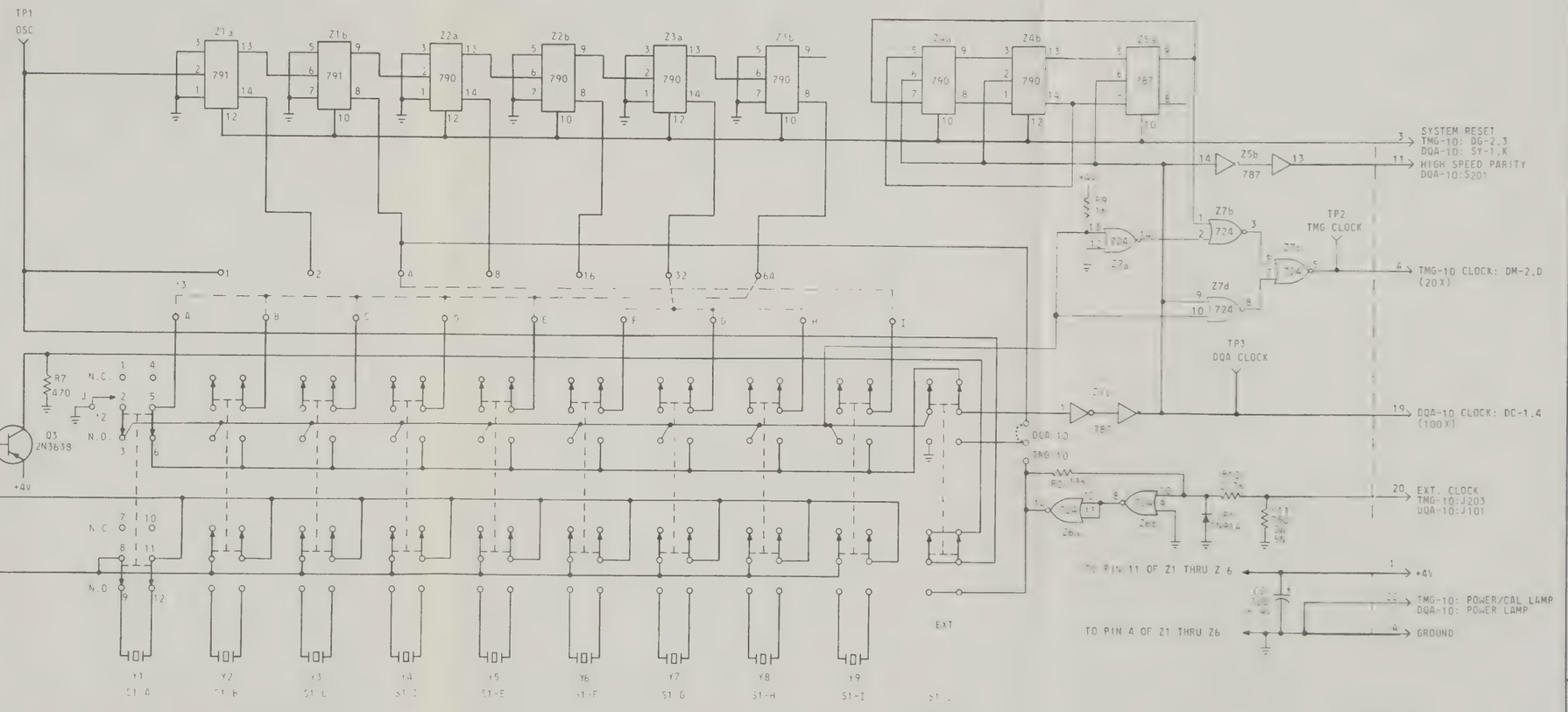
BAUD RANGE	MULTIPLIER	STRAP
2.5K - 7.5K	64	64
7K - 15K	32	32
14K - 30K	16	16
28K - 60K	8	8

TO DETERMINE THE CRYSTAL FREQUENCY IN Hz, USE THE FOLLOWING PROCEDURE:

1. SELECT THE PROPER CRYSTAL SELECTION CHART ABOVE.
2. DETERMINE THE MULTIPLIER IN THE CHART AS A FUNCTION OF THE BAUD REQUIRED.
3. MULTIPLY THE REQUIRED BAUD BY THE MULTIPLIER IN NOTE 2 ABOVE. THE RESULTANT NUMBER IS THE CRYSTAL FREQUENCY IN Hz REQUIRED.

	TMG-10 ONLY		CS-4-3 TMG-10/DQA-10		
	FREQ. IN KHz	STRAP	BAUD	FREQ. IN KHz.	STRAP	BAUD
	320.000	A-32	110	291.509	A-64	45.5
	320.000	B-32	134.49	320.000	B-64	50.0
	384.000	C-32	150	480.000	C-64	75.0
	426.666	D-8	600	256.000	D-32	80.0
	475.052	E-2	1200	264.000	E-32	82.5
	352.000	F-1	2400	307.200	F-32	96.0
	430.368	G-1	4800	320.000	G-32	100
	480.000	H-1	9600	320.000	H-16	200
	960.000	I-1	50,000	480.000	I-16	300

TERMINAL J CONNECTED TO
SEE NOTE 2.



NOTE

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   B. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
2. TERMINAL "J" IS USED WITH SPEEDS ABOVE 10,000 BAUD IN THE TMG-10 ONLY.
3. STRAPPING SHOWN CORRESPONDS TO CS-4-1.
4. S1 IS MECHANICALLY INTERLOCKED SWITCH WITH S1-A SHOWN IN THE ENERGIZED POSITION, (PUSHED-IN).
5. CRYSTALS SHALL BE TESTED IN ACCORDANCE WITH ATLANTIC RESEARCH CORP. DRAWING NO. TP-21801000.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES.
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS

DO NOT SCALE DRAWING

MATERIAL

APPROVAL	BY	DATE
DRAWN	E.P. Timbers	7/26/69
CHECKED	S. Hicks	7/...
ENGRG		8/18/70
PROJ ENGRG		8/18/70
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DIVISION
ALEXANDRIA, VIRGINIA

SCHEMATIC DIAGRAM CLOCK SOURCE CS-4

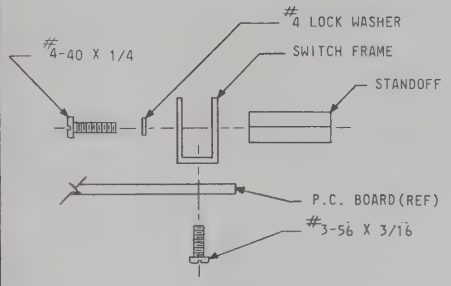
SERIES "A"

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41898688	D LTR

SCALE NONE SHEET 1 OF 1

DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

REVISIONS						
SYM	DESCRIPTION		DATE	BY	CHK	APPD
A	ADDED NOTE 4.& 5 & STRAPPING.	EN 1007	5-20-70	PES	WKH	AR
B	CASE SIZE OF Q2 WAS TO18.	EN 1105	7-20-70	EV	WKH	AR
C	ADDED NOTE 6.	EN 1374	10/11/71	EV	WKH	



DETAIL "A"

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

APPROVAL	BY	DATE
DRAWN	E. Vinson	1/29/70
CHECKED	S. INKS	2/16/70
ENGRG	W. Hardy	2/16/70
PROJ ENGRG	[illegible]	2-16-70
STRESS		

APPROVED FOR ATLANTIC RESEARCH _____ NAME _____ DATE 19__

APPROVED _____ NAME _____ DATE 19__

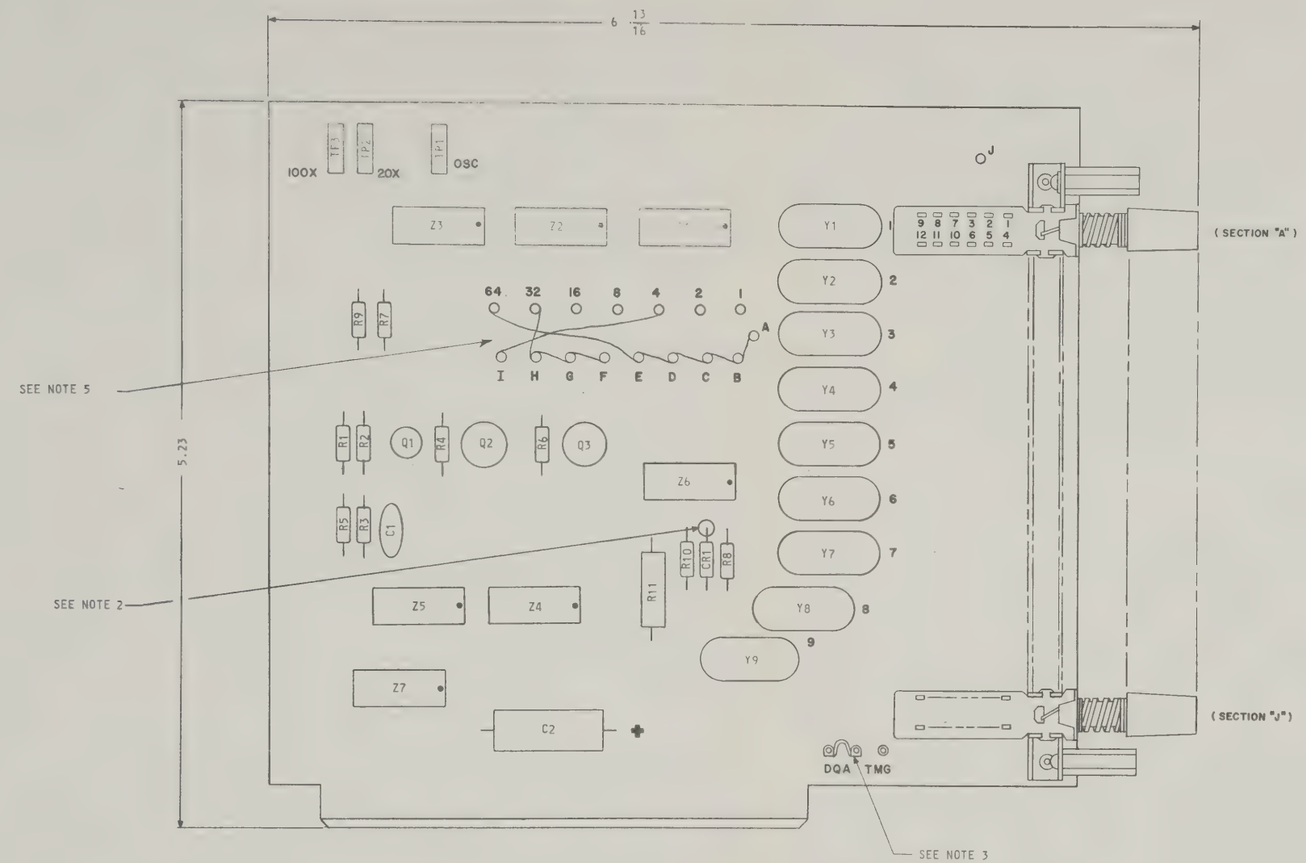
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA 22314

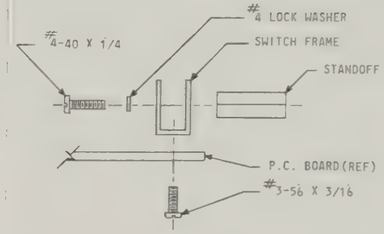
PRINTED CIRCUIT BOARD ASS'Y CLOCK SOURCE CS-4

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41899688	C LTR

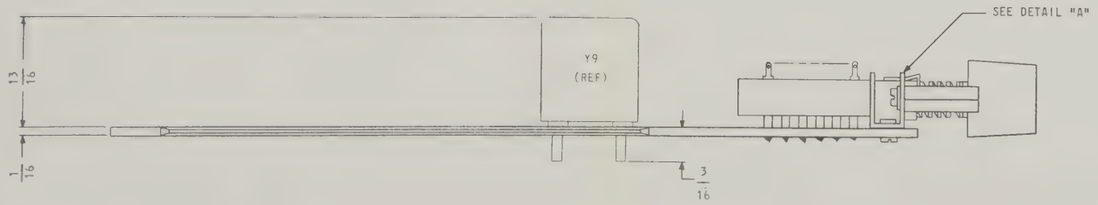
SCALE: 2/1 SHEET 1 OF 1

REVISIONS						
SYM	DESCRIPTION		DATE	BY	CHK	APPD
A	ADDED NOTE 4.& 5 & STRAPPING.	EN 1007	5-20-70	PGS	[illegible]	[illegible]
B	CASE SIZE OF Q2 WAS TO18.	EN 1105	7-20-70	EV	[illegible]	[illegible]
C	ADDED NOTE 6.	EN 1374	10/21/71	EV	[illegible]	[illegible]





DETAIL "A"



NOTES:

1. ALL DIMENSIONS ARE REFERENCE.
2. CIRCLE INDICATES CATHODE END OF DIODE.
3. STRAP POSITION SHOWN IS FOR REFERENCE ONLY.
4. INSTALL SWITCH LABELS ACCORDING TO SPEED CHART ON SCHEMATIC DIAGRAM, TP-SD-41898688.
5. STRAPPING SHOWN IS FOR CS-4-1.
6. INSTALL SWITCHES AFTER WAVESOLDER AND CLEANING OPERATION.

ALL	TP-FA-41834676	TMG-10
ALL	TP-FA-41872690	DQA-10
DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ± ——
FRACTIONS ± ——
2 PLACE DECIMALS ± ——
3 PLACE DECIMALS ± ——
SURFACE ROUGHNESS √
DO NOT SCALE DRAWING
MATERIAL: ——

APPROVAL	BY	DATE
DRAWN	E. Vinson	1/29/70
CHECKED	S. JUKS	2/16/70
ENGRG	[illegible]	2/16/70
PROJ ENGRG	[illegible]	3/17/70
STRESS		

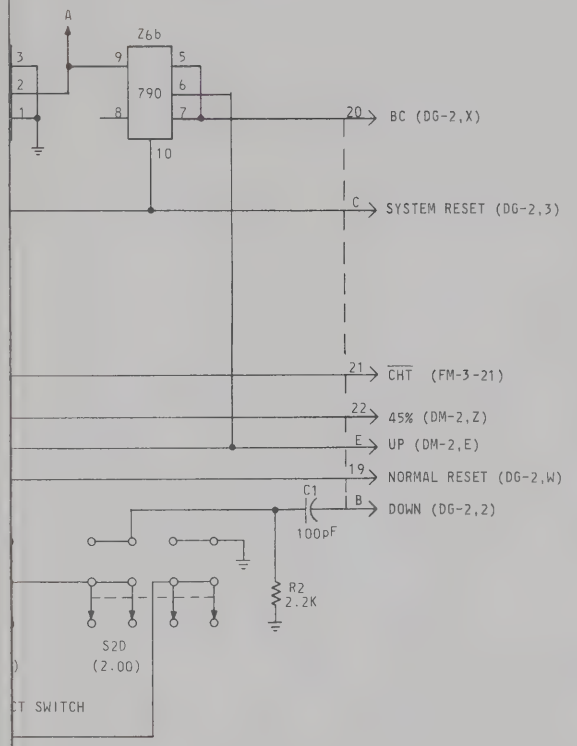
APPROVED FOR ATLANTIC RESEARCH — NAME — DATE — 19
APPROVED — NAME — DATE — 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

PRINTED CIRCUIT BOARD ASS'Y CLOCK SOURCE CS-4

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41899688	C LTR
SCALE: 2/1		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE		



NOTES:

1. UNLESS OTHER
   A. ALL CA
   B. ALL RE
2. S1, LEVEL SE
   S1C SHOWN IN
   S2, STOP ELE
   WITH S2C SHO

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

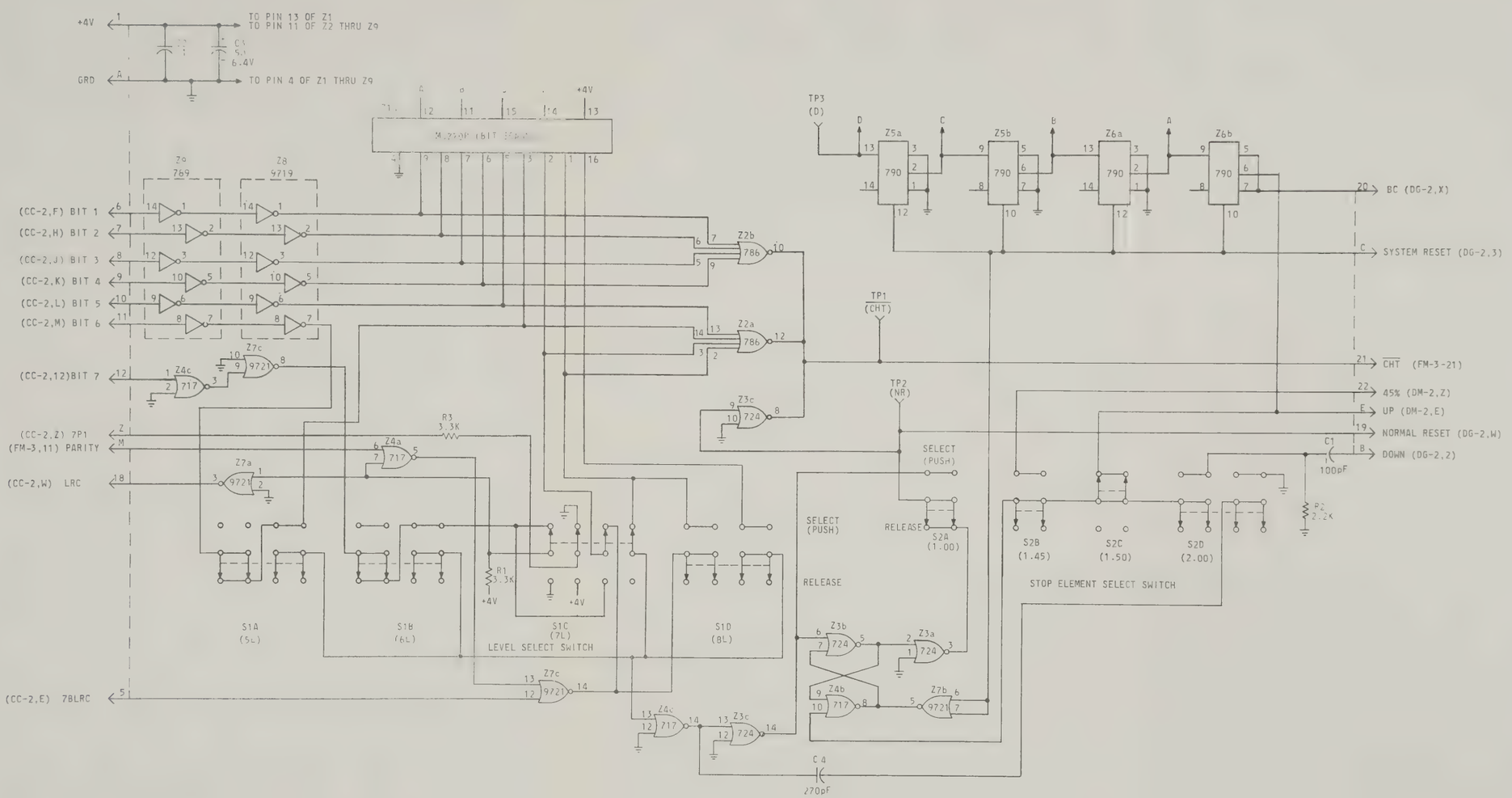
ECIFIED	APPROVAL	BY	DATE
CHES.	DRAWN	E Elvinson	7/22/69
	CHECKED		8/26/69
	ENGRG		
	PROJ ENGRG		11-14-69
	STRESS		
WING	APPROVED FOR ATLANTIC RESEARCH NAME DATE 19		
	APPROVED NAME DATE 19		

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

SCHEMATIC DIAGRAM
BIT COUNTER
BC-1 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41808676	A LTR
SCALE —			SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE		



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   B. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
2. S1, LEVEL SELECT, IS A MECHANICALLY INTERLOCKED SWITCH WITH S1C SHOWN IN THE ENERGIZED POSITION, (PUSHED IN).
   S2, STOP ELEMENT SELECT, IS A MECHANICALLY INTERLOCKED SWITCH WITH S2C SHOWN IN THE ENERGIZED POSITION, (PUSHED IN).

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS √
DO NOT SCALE DRAWING
MATERIAL:

	BY	DATE
APPROVAL		
DRAWN	E Davison	7/22/69
CHECKED		
ENGRG		
PROJ ENGRG	Peterson	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH _____ 19__ (NAME / DATE)
APPROVED _____ 19__ (NAME / DATE)

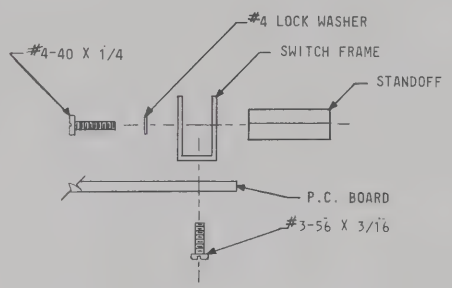
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

SCHEMATIC DIAGRAM
BIT COUNTER
BC-I (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41808676	A LTR
SCALE —			SHEET 1 OF 1

-1	TP-AD-41810676	676
DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED NOTE 2. EN 1374	10/14/71	[illegible]	[illegible]	[illegible]



DETAIL "A"

NOTES:
1. ALL D[illegible]ECIFIED
2. INSTA[illegible]CHES.
CLEAN

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

	APPROVAL	BY	DATE
DRAWN		E Vinson	3/25/69
CHECKED		[illegible]	6/24/69
ENGRG		[illegible]	7/1/69
PROJ ENGRG		[illegible]	11-14-69
STRESS			

APPROVED FOR ATLANTIC RESEARCH
NAME _____ DATE _____ 19__

APPROVED
NAME _____ DATE _____ 19__

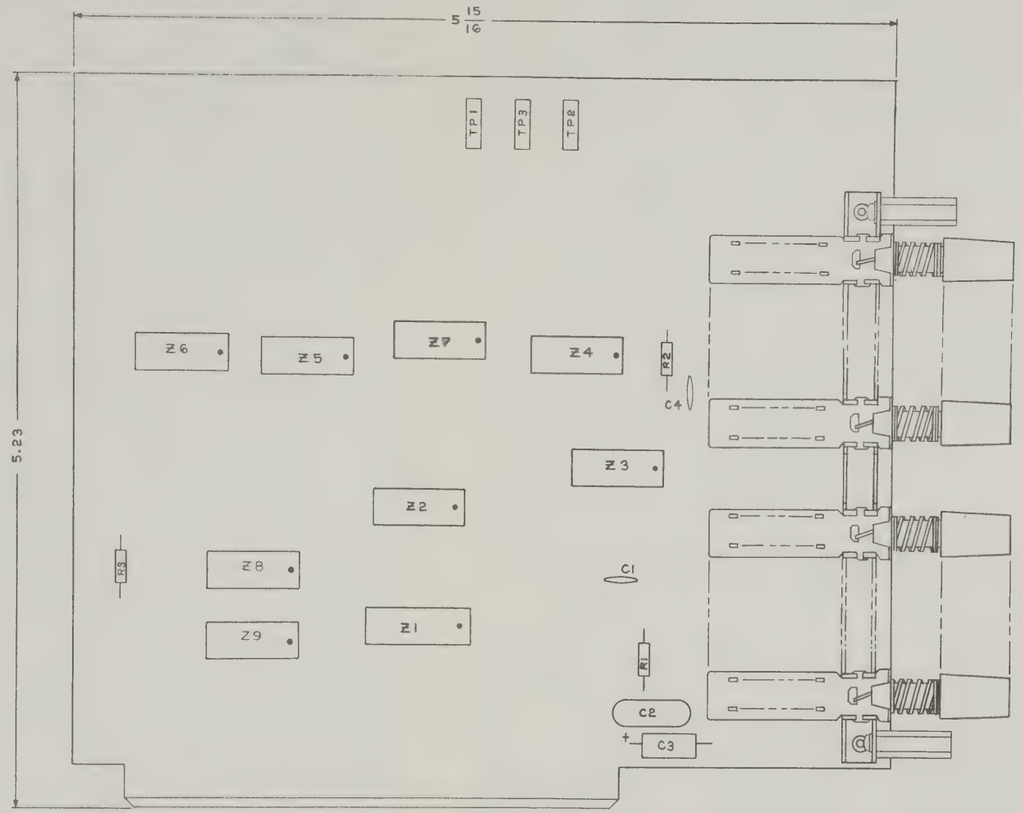
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

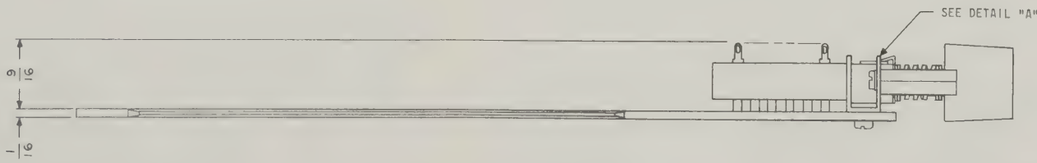
PRINTED CIRCUIT BOARD ASS'Y
BIT COUNTER BC-1 (TMG-10)

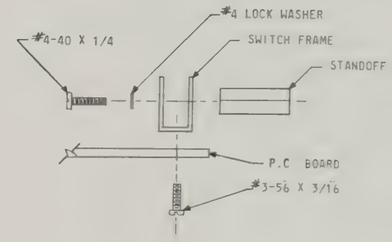
CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41810676	A LTR

SCALE 2/1 SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED NOTE 2. EN 1374	11/11/71	[illegible]	[illegible]	[illegible]







DETAIL "A"

NOTES:
1. ALL DIMENSIONS ARE REFERENCE.
2. INSTALL SWITCHES AFTER WAVESOLDER AND CLEANING OPERATION.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

DASH NO.	NEXT ASSEMBLY	PROJECT
-1	TP-FA-41834676-2	676
-1	TP-FA-41834676-1	676

APPLICATION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS

DO NOT SCALE DRAWING

MATERIAL:

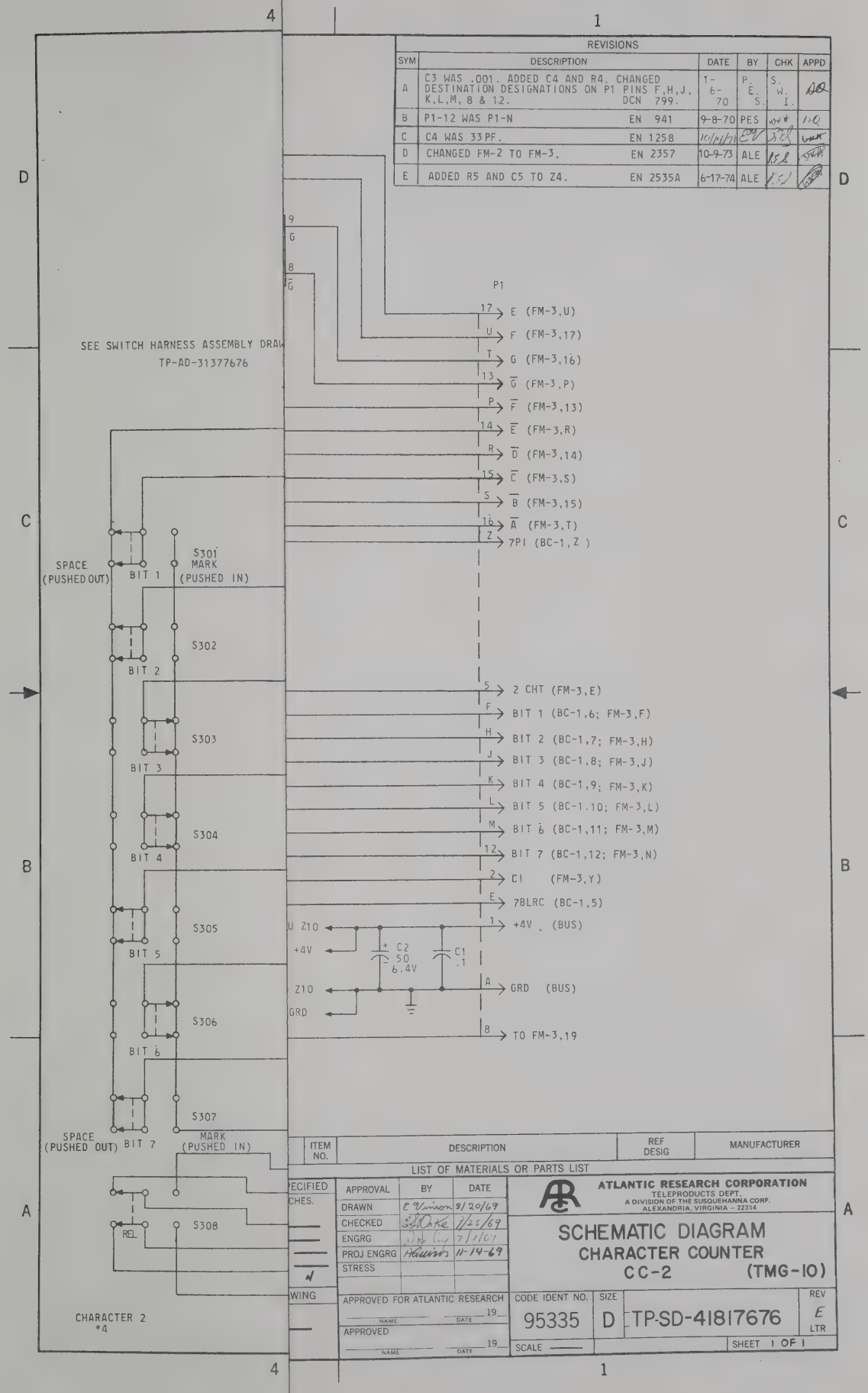
APPROVAL	BY	DATE
DRAWN	B Gilmore	3/25/69
CHECKED	[illegible]	6/24/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11/10/69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

PRINTED CIRCUIT BOARD ASS'Y
BIT COUNTER
BC-1 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41810676	A LTR
SCALE 2/1		SHEET 1 OF 1	


REVISIONS
SYM | DESCRIPTION | DATE | BY | CHK | APPD
A | C3 WAS .001. ADDED C4 AND R4. CHANGED DESTINATION DESIGNATIONS ON P1 PINS F,H,J, K,L,M, 8 & 12. DCN 799. | 1-6-70 | P.E.S. | S.W.I.
B | P1-12 WAS P1-N EN 941 | 9-8-70 | PES
C | C4 WAS 33PF. EN 1258 | 10/11/71
D | CHANGED FM-2 TO FM-3. EN 2357 | 10-9-73 | ALE
E | ADDED R5 AND C5 TO Z4. EN 2535A | 6-17-74 | ALE
P1
17 E (FM-3,U)
U F (FM-3,17)
T G (FM-3,16)
13 G (FM-3,P)
P F (FM-3,13)
14 E (FM-3,R)
R D (FM-3,14)
15 C (FM-3,S)
S B (FM-3,15)
16 A (FM-3,T)
Z 7PI (BC-1,Z)
SEE SWITCH HARNESS ASSEMBLY DRAW
TP-AD-31377676
S301
SPACE (PUSHED OUT)
BIT 1
MARK (PUSHED IN)
S302
BIT 2
S303
BIT 3
S304
BIT 4
S305
BIT 5
S306
BIT 6
S307
SPACE (PUSHED OUT)
BIT 7
MARK (PUSHED IN)
S308
REL
CHARACTER 2
*4
5 2 CHT (FM-3,E)
F BIT 1 (BC-1,6; FM-3,F)
H BIT 2 (BC-1,7; FM-3,H)
J BIT 3 (BC-1,8; FM-3,J)
K BIT 4 (BC-1,9; FM-3,K)
L BIT 5 (BC-1.10; FM-3,L)
M BIT 6 (BC-1,11; FM-3,M)
12 BIT 7 (BC-1,12; FM-3,N)
2 C1 (FM-3,Y)
E 7BLRC (BC-1,5)
1 +4V (BUS)
U Z10
+4V
C2 50 6.4V
C1 .1
Z10
GRD
A GRD (BUS)
8 TO FM-3,19
ITEM NO. | DESCRIPTION | REF DESIG | MANUFACTURER
LIST OF MATERIALS OR PARTS LIST
APPROVAL | BY | DATE
DRAWN E Union 9/20/69
CHECKED S.H.Drake 11/25/69
ENGRG J.M. Tim 7/1/69
PROJ ENGRG H.Weiss 11-14-69
STRESS
APPROVED FOR ATLANTIC RESEARCH
APPROVED
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314
SCHEMATIC DIAGRAM
CHARACTER COUNTER
CC-2 (TMG-10)
CODE IDENT NO. 95335
SIZE D
TP-SD-41817676
REV E LTR
SCALE
SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	C3 WAS .001. ADDED C4 AND R4. CHANGED DESTINATION DESIGNATIONS ON P1 PINS F,H,J, K,L,M, 8 & 12. DCN 799.	1-6-70	P. E. S.	S. W. I.	
B	P1-12 WAS P1-N	EN 940			
C	C4 WAS 33 PF	EN 1288			
D	CHANGED FM-2 TO FM-3.	EN 2357		ALE	
E	ADDED R5 AND C5 TO Z4.	EN 2535A	6-17-74	ALE	

SEE SWITCH HARNESS ASSEMBLY DRAWING TP-AD-31377676

J301 P2

S301 SPACE (PUSHED OUT) BIT 1 MARK (PUSHED IN)

S302 BIT 2

S303 BIT 3

S304 BIT 4

S305 BIT 5

S306 BIT 6

S307 SPACE (PUSHED OUT) BIT 7 MARK (PUSHED IN)

S308 REL

S1 SPACE (PUSHED OUT) BIT 1 MARK (PUSHED IN)

S2 BIT 2

S3 BIT 3

S4 BIT 4

S5 BIT 5

S6 BIT 6

S7 SPACE (PUSHED OUT)

S8 MARK (PUSHED IN)

SEE NOTE 3

(BC-1,18) LRC

(FM-3,C) REL NC

(DG-2,V) NO RESET

(DG-2,18) SYSTEM RESET

(DG-2,3) PART OF P1

R1 3.3K

R2 3.3K

R3 3.3K

R4 3.3K

R5 1K

C3 330pF

C4 150pF

C5 .001

+4V

TP1 CCR

CHARACTER 2 *4

CHARACTER 1

NORMAL PUSH-IN (MOMENTARY) REL SWITCH ACTION

P1

- 17 → E (FM-3,U)
- U → F (FM-3,17)
- T → G (FM-3,16)
- 13 → $\overline{G}$ (FM-3,P)
- P → $\overline{F}$ (FM-3,13)
- 14 → $\overline{E}$ (FM-3,R)
- R → $\overline{D}$ (FM-3,14)
- 15 → $\overline{C}$ (FM-3,S)
- S → $\overline{B}$ (FM-3,15)
- 16 → $\overline{A}$ (FM-3,T)
- Z → 7P1 (BC-1,Z)
- S → 2 CNT (FM-3,E)
- F → BIT 1 (BC-1,6; FM-3,F)
- H → BIT 2 (BC-1,7; FM-3,H)
- J → BIT 3 (BC-1,8; FM-3,J)
- K → BIT 4 (BC-1,9; FM-3,K)
- L → BIT 5 (BC-1,10; FM-3,L)
- M → BIT 6 (BC-1,11; FM-3,M)
- 12 → BIT 7 (BC-1,12; FM-3,N)
- 2 → CI (FM-3,Y)
- E → 7BLRC (BC-1,5)
- i → +4V (BUS)
- h → GRD (BUS)
- 8 → TO FM-3,19

TO PIN 11 OF Z1 THRU Z10 → +4V

TO PIN 4 OF Z1 THRU Z10 → GRD

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   B. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
   C. ALL INTEGRATED CIRCUITS ARE MC9719P.
2. S1 THRU S8 IS AN ASSEMBLY COMPOSED OF 8 INDEPENDENT, NONINTERLOCKED SWITCHES.
3. THESE STRAPS ARE PLACED IN ACCORDANCE TO THE LRC REQUIREMENTS OF THE 7 LEVEL MESSAGE ONLY (SEE MANUAL).
4. CHARACTER 2 IS A SEPARATE SUBASSEMBLY SHOWN HERE FOR CLARIFICATION PURPOSES ONLY.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

-1	TP-AD-41819676	676
DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS
DO NOT SCALE DRAWING
MATERIAL:

	APPROVAL	BY	DATE
DRAWN		E. Vinson	9/20/69
CHECKED		E. Case	11/25/69
ENGRG			
PROJ ENGRG			11-14-69
STRESS			

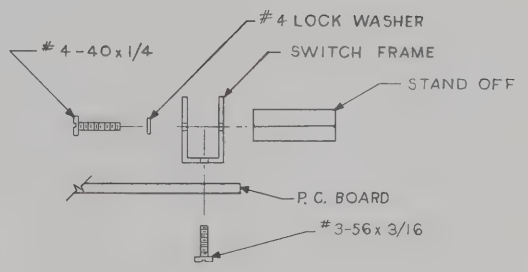
APPROVED FOR ATLANTIC RESEARCH NAME DATE 19
APPROVED NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA — 22314

SCHEMATIC DIAGRAM
CHARACTER COUNTER
CC-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41817676	E LTR
SCALE			SHEET 1 OF 1

REVISIONS						
SYM	DESCRIPTION		DATE	BY	CHK	APPD
A	ADDED C4 & R4	DCN 799	1-6-70	P.E.S.	[illegible]	[illegible]
B	ADDED NOTE 2.	EN 1374	10/14/71	[illegible]	[illegible]	[illegible]
C	ADDED C5 & R5	EN2535A	6/20/74	ALE.	[illegible]	[illegible]



DETAIL A

NOTES:
1. ALL
2. INST
CLEA

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

PECIFIED
ICHES.
N
AWING

APPROVAL	BY	DATE
DRAWN	[illegible]	4-2-69
CHECKED	W K H	6-24-69
ENGRG	W Hessling	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

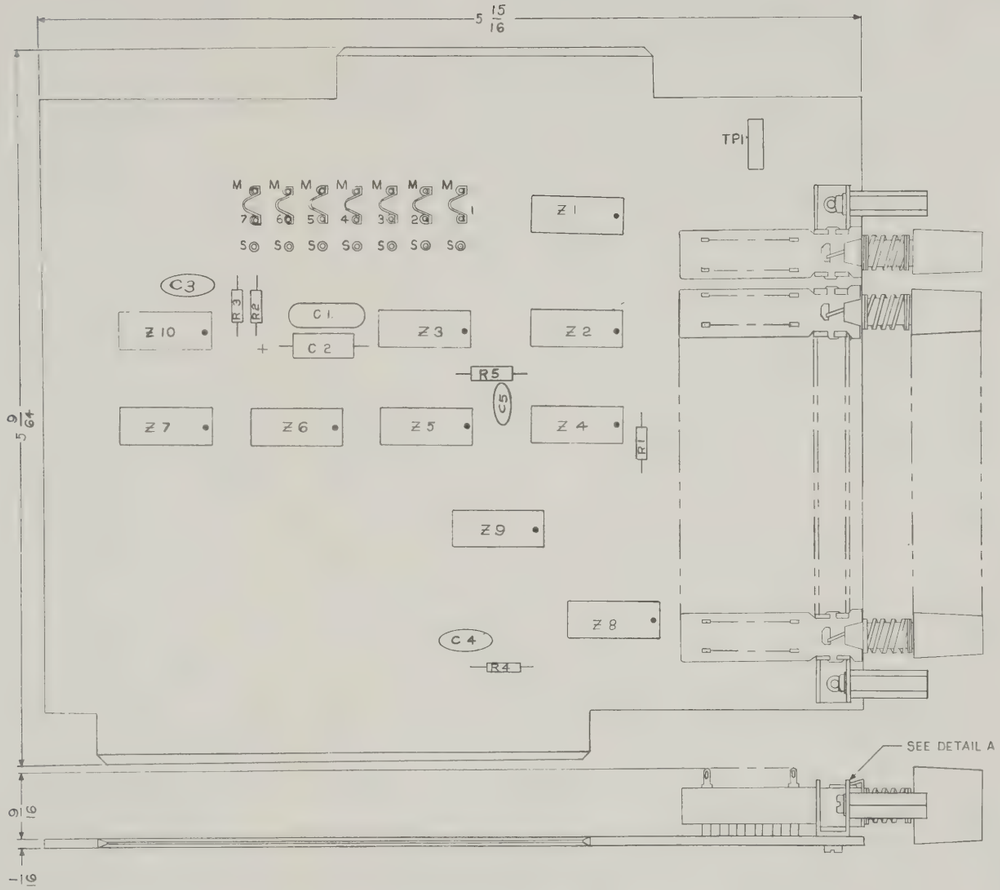
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNIA CORP.
ALEXANDRIA, VIRGINIA – 22314

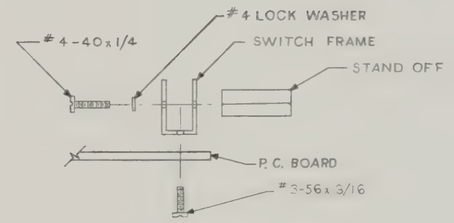
PRINTED CIRCUIT BOARD ASS'Y
CHARACTER COUNTER
CC-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41819676	C LTR

SCALE: 2/1 SHEET: 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED C4 & R4 DCN 799	4-6-70	P.E.S.		
B	ADDED NOTE 2. EN 1374	10/14/70	[illegible]		
C	ADDED C5 & R5 EN2535A	6/20/74	ALE.		





DETAIL A

NOTES:
1. ALL DIMENSIONS ARE REFERENCE.
2. INSTALL SWITCHES AFTER WAVESOLDER AND CLEANING OPERATION.

QTY REQD	PART OR IDENTIFYING NO	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER
-1	TP-FA-41834676-2	676			
-1	TP-FA-41834676-1	676			
DASH NO.	NEXT ASSEMBLY	PROJECT			
APPLICATION					

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS

DO NOT SCALE DRAWING

MATERIAL:

	APPROVAL	BY	DATE
DRAWN			
CHECKED			
ENGRG			7/1/69
PROJ ENGRG			11-14-69
STRESS			

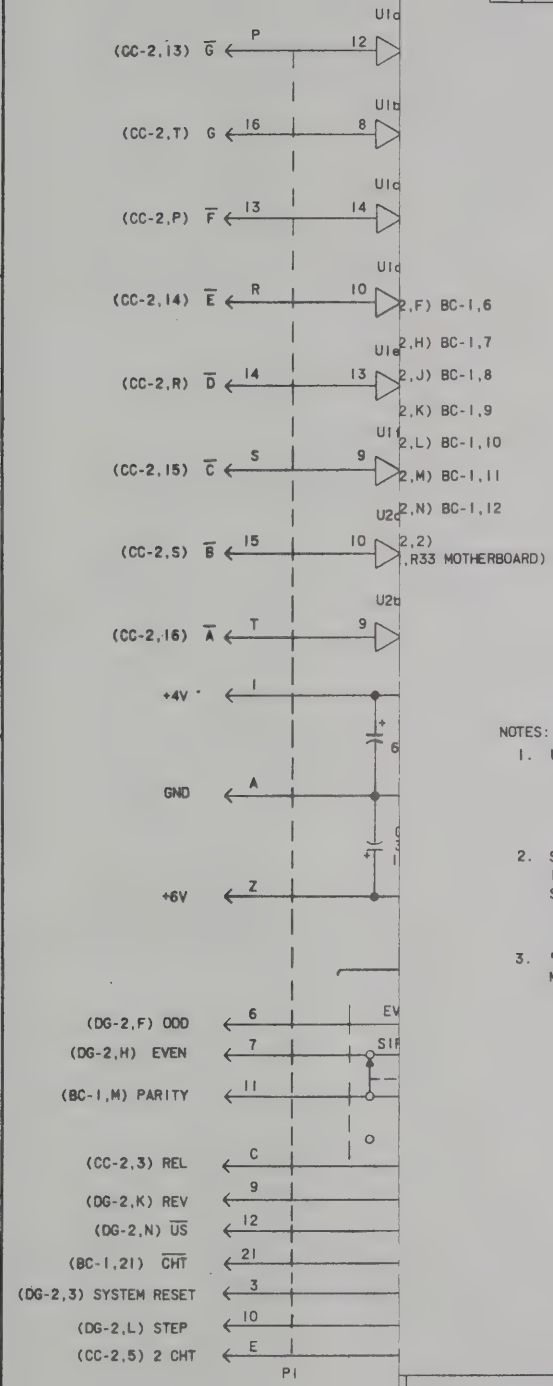
APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

PRINTED CIRCUIT BOARD ASS'Y
CHARACTER COUNTER
CC-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41819676	C LTR
SCALE 2:1		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED SERIES TO "B". EN 2452 DELETED R9 THRU R16. EN 2452A	4-1-74	AJH	PEB	WKH
B	ADDED CR1, CHANGED +6V TO +5V, EXCEPT INPUT. EN 2452B	6-17-74	ALE		



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   - B. ALL INTEGRATED CIRCUITS ARE MC9719P.
   - C. ALL RESISTANCE VALUES ARE IN OHMS, ±10%, 1/4W.
2. S1A,B,C AND D MESSAGE SELECT, ARE MECHANICALLY INTERLOCKED WITH S1A SHOWN ENERGIZED, (PUSHED IN). S1E AND S1F, PARITY SELECT, IS A MECHANICALLY INTERLOCKED SWITCH WITH S1F SHOWN ENERGIZED (PUSHED IN).
3. "5LF1" SHALL BE INTERPRETED AS "FIVE LEVEL FOX MESSAGE, MODULE NO. 1."

DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

APPROVAL	BY	DATE
DRAWN	AL E.	4-25-73
CHECKED		6-4-73
ENGRG		
PROJ ENGRG		10-24-73

APPROVED FOR ATLANTIC RESEARCH

NAME _____ DATE _____ 19

APPROVED

NAME _____ DATE _____ 19

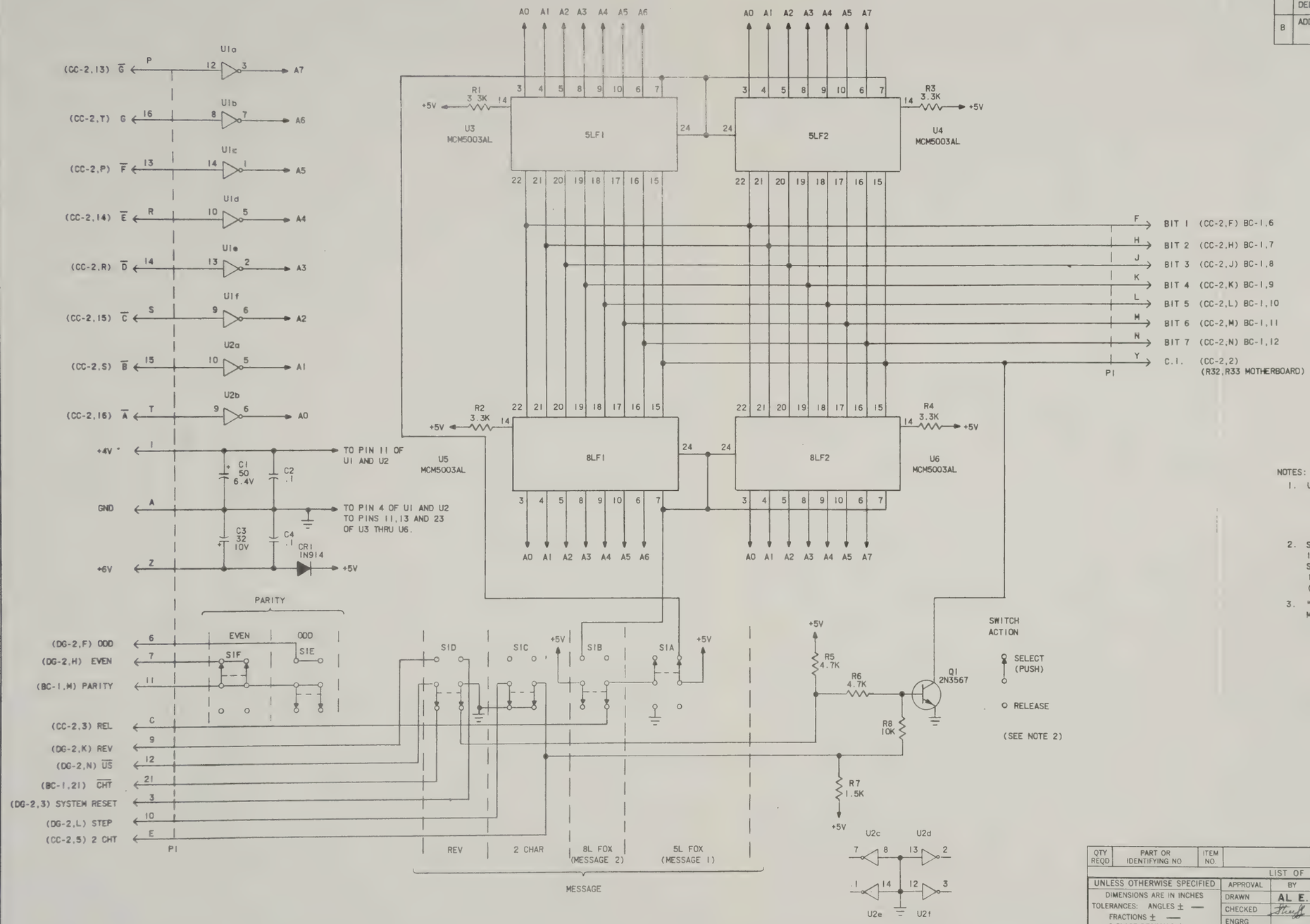
ATLANTIC RESEARCH CORPORATION
ALEXANDRIA, VIRGINIA 22314

SCHEMATIC DIAGRAM
FIXED MESSAGE
FM-3 SERIES "B" (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41837676	B

SCALE: — SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED SERIES TO "B". EN 2452 DELETED R9 THRU R16. EN 2452A	4-1-74	AJH	PBS	WZH
B	ADDED CR1, CHANGED +6V TO +5V, EXCEPT INPUT. EN 2452B	6-17-74	ALE		



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   - B. ALL INTEGRATED CIRCUITS ARE MC9719P.
   - C. ALL RESISTANCE VALUES ARE IN OHMS, ±10%, 1/4W.
2. S1A,B,C AND D MESSAGE SELECT, ARE MECHANICALLY INTERLOCKED WITH S1A SHOWN ENERGIZED, (PUSHED IN). S1E AND S1F, PARITY SELECT, IS A MECHANICALLY INTERLOCKED SWITCH WITH S1F SHOWN ENERGIZED (PUSHED IN).
3. "5LF1" SHALL BE INTERPRETED AS "FIVE LEVEL FOX MESSAGE, MODULE NO. 1."

QTY REQD	PART OR IDENTIFYING NO	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED	APPROVAL	BY	DATE
DIMENSIONS ARE IN INCHES	DRAWN	AL E.	4-25-73
TOLERANCES: ANGLES ± — FRACTIONS ± — 2 PLACE DECIMALS ± — 3 PLACE DECIMALS ± — SURFACE ROUGHNESS √	CHECKED		6-8-73
	ENGRG		
	PROJ ENGRG		10-24-73
DO NOT SCALE DRAWING	APPROVED FOR ATLANTIC RESEARCH		
MATERIAL: —	APPROVED	NAME	DATE 19

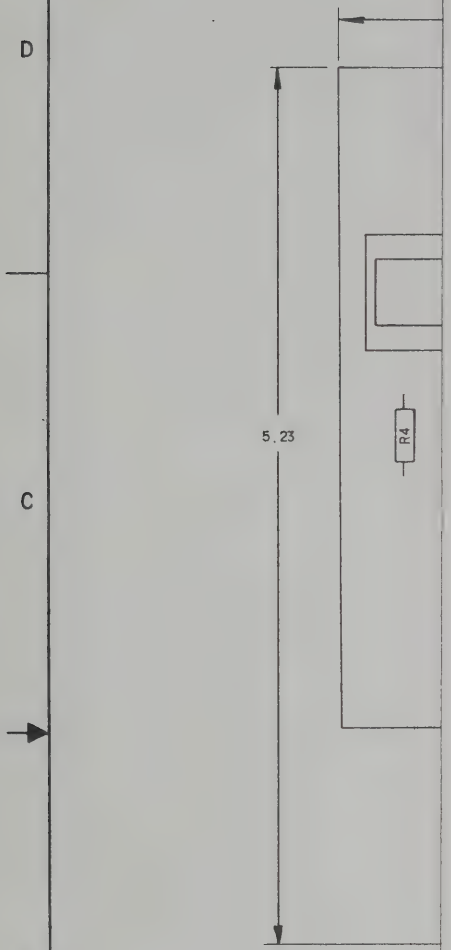
ATLANTIC RESEARCH CORPORATION
ALEXANDRIA, VIRGINIA 22314

SCHEMATIC DIAGRAM
FIXED MESSAGE
FM-3 SERIES "B" (TMG-10)

DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41837676	B
SCALE: —		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	DELETED R9 THRU 16 EN2152A	3-29-74	A JH	YES	WKM
B	ADDED CR1 AND NOTE 4. EN 2452B	6/17/74	ALE	YES	WKM



NOTES:

1. ALL DIMENSIONS ARE REFERENCE.
2. INSTALL SWITCHES AFTER WAVESOLDER AND CLEANING OPERATION.
3. PULL-UP RESISTORS R9 THRU R16 ARE NOT USED IN STANDARD TMG-10 APPLICATION.
4. SQUARE PAD ☐ INDICATES CATHODE END OF DIODE.

DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

APPROVAL	BY	DATE
DRAWN	AL E.	10-18-73
CHECKED	J. Sweeney	10-23-73
ENGRG		
PROJ ENGRG	W. Hawley	10-24-73
APPROVED FOR ATLANTIC RESEARCH		
NAME	DATE	19
APPROVED		
NAME	DATE	19

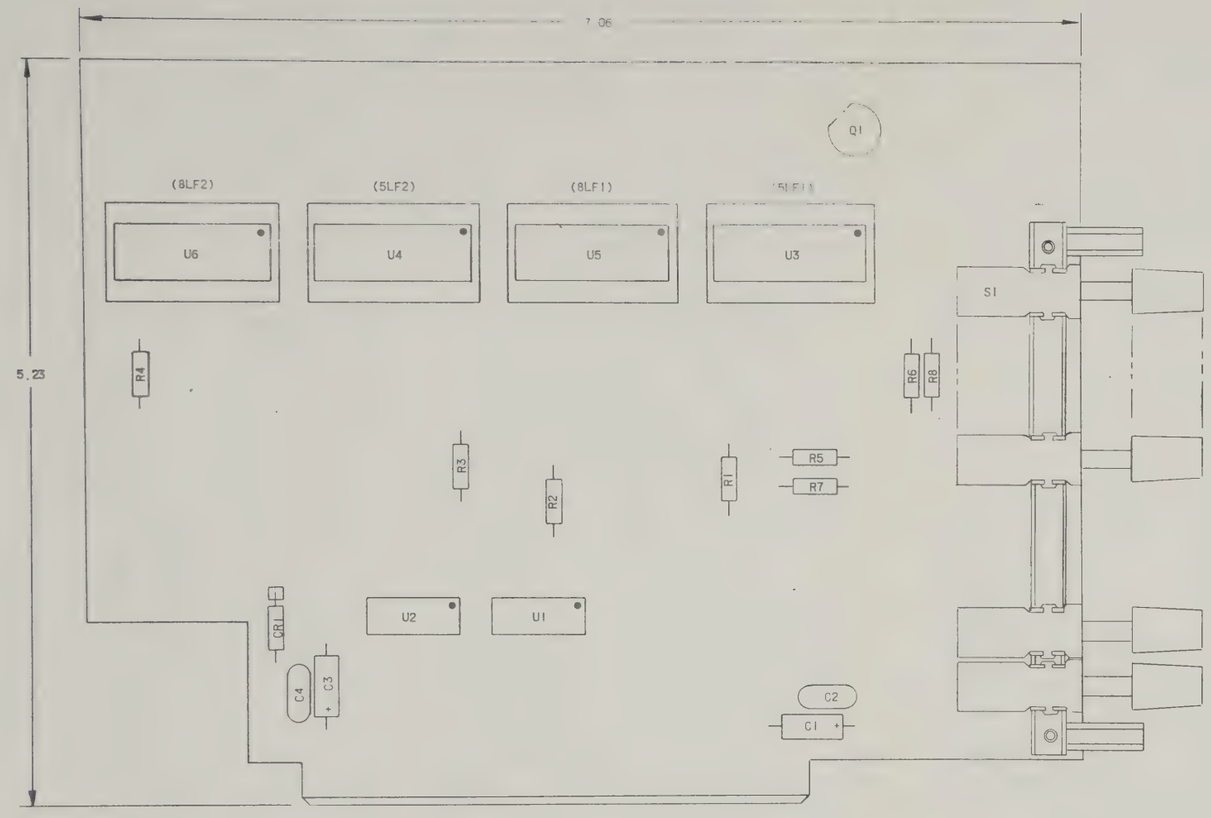
ATLANTIC RESEARCH CORPORATION
ALEXANDRIA VIRGINIA 22314

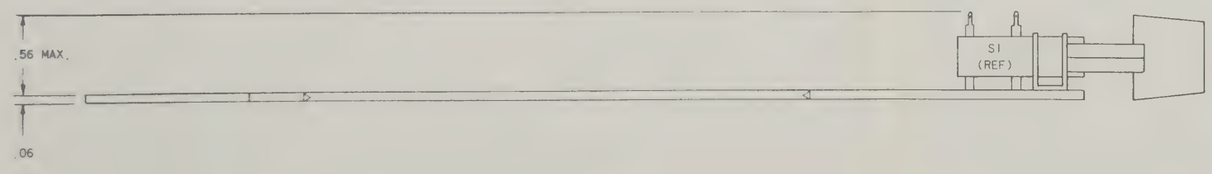
PRINTED CIRCUIT BOARD ASSY
FIXED MESSAGE
FM-3 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41835676	B

SCALE: SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	DELETED R9 THRU 16 EN2452A	3/27/74	A.T.	[illegible]	[illegible]
B	ADDED CR1 AND NOTE 4. EN 2452B	6/17/74	ALE	[illegible]	[illegible]





NOTES:
1. ALL DIMENSIONS ARE REFERENCE.
2. INSTALL SWITCHES AFTER WAVESOLDER AND CLEANING OPERATION.
3. PULL-UP RESISTORS R9 THRU R16 ARE NOT USED IN STANDARD TMG-10 APPLICATION.
4. SQUARE PAD □ INDICATES CATHODE END OF DIODE.

QTY REQD	PART OR IDENTIFYING NO	ITEM NO	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± —
FRACTIONS ± —
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± —
SURFACE ROUGHNESS √
DO NOT SCALE DRAWING
MATERIAL:

	APPROVAL	BY	DATE
DRAWN		AL E.	10-18-73
CHECKED		[illegible]	10-23-73
ENGRG			
PROJ ENGRG		[illegible]	10-24-73

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
ALEXANDRIA VIRGINIA 22314

PRINTED CIRCUIT BOARD ASSY
FIXED MESSAGE
FM-3 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41835676	B

SCALE: SHEET 1 OF 1

DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	R3 WAS 1.8K. ADDED JUMPER BETWEEN 52B N.C. PINS. CHANGED DESTINATION DESIGNATIONS ON PINS 2 & 3. DCN 799.	1/7/70	SW	SW	AR
B	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE	[illegible]	[illegible]
C	CHANGED OS-1 TO OS-2. EN 2452	4-3-74	AJH	PES	[illegible]
D	R3 WAS 1.5k EN 2687	5/7/76	JP	[illegible]	WJH

(DM-2

(FM-3

+4V (BUS)

C1 50 6.4V

C2 .1

GRD (BUS)

(DM-2,B; OS-2,8; CS-3,2; BC-1,B

(FM-3,7)

+4V

R4 3.3K

NC (CC-2,18)

UP (DM-2,E)

NO (CC-2,V)

R5 3.3K

+4V

(CC-2,C; BC-1,C; CS-3,3; FM-3,3; DM-2,C) SYS

(FM-3,6) ODD

(FM-3,9)

DIST SIGS(R34, MOTHER BOARD)

BC (BC-1,20)

S3 *4

STEP (FM-3,10)

NORMAL RESET (BC-1,19)

STEP

* NOTES:

1. UNLESS OTH
   A. ALL C
   B. ALL R
2. THE "TYPE O INTERLOCKE POSITION (
3. THE "MODE SWITCH. S IN).
4. S3 IS A MO POSITION.

DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

APPROVAL	BY	DATE
DRAWN	EJ Vinson	3/13/69
CHECKED	EJ Kate	3/17/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH

NAME DATE 19

APPROVED

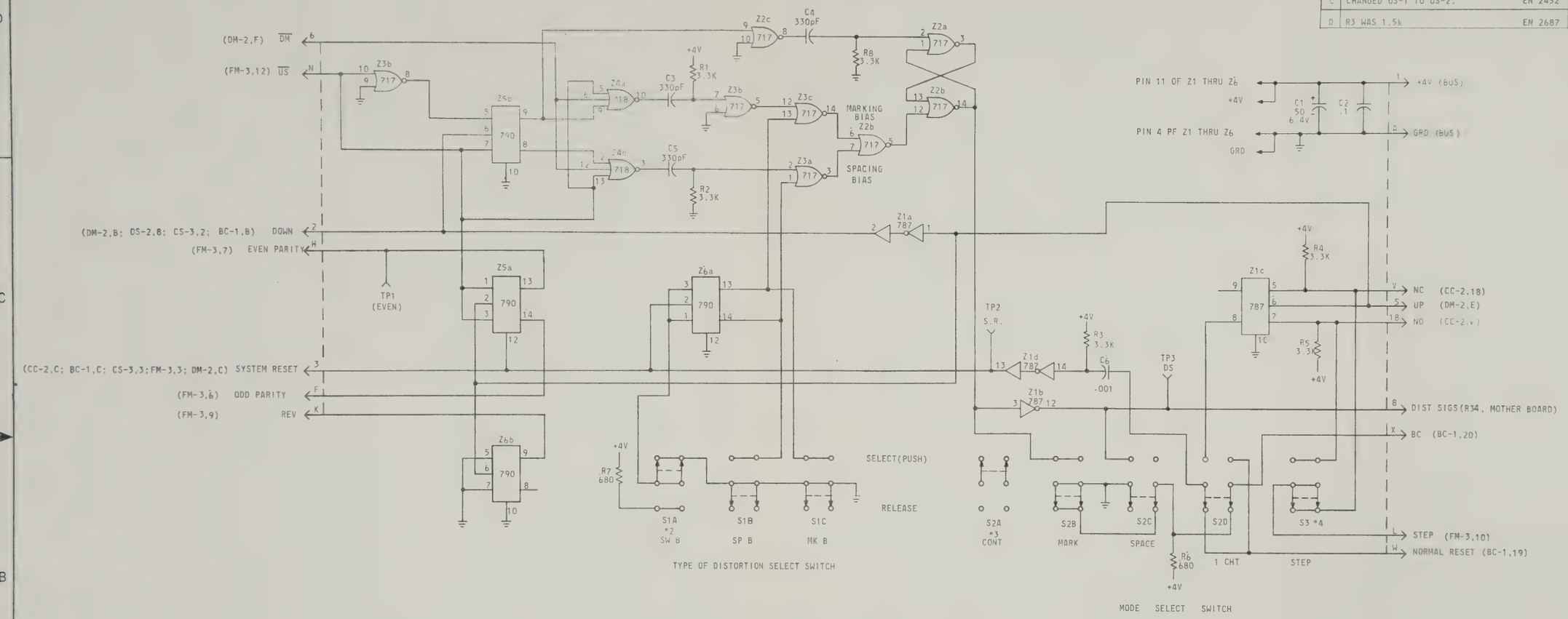
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

SCHEMATIC DIAGRAM
DISTORTION GATING
DG-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41814676	D LTR
SCALE —			SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	R3 WAS 1.8K. ADDED JUMPER BETWEEN 52B N.C. PINS. CHANGED DESTINATION DESIGNATIONS ON PINS 2 & 3. DCN 799.	1/7/70	SWJ	SWJ	AHL
B	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE	[illegible]	[illegible]
C	CHANGED OS-1 TO OS-2. EN 2452	4-3-74	AJH	PES	[illegible]
D	R3 WAS 1.5k EN 2687	5/7/76	[illegible]	[illegible]	[illegible]



• NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   A. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
   B. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
2. THE "TYPE OF DISTORTION" SWITCH IS A MECHANICALLY INTERLOCKED SWITCH. S1A IS SHOWN IN THE ENGERGIZED POSITION (PUSHED IN).
3. THE "MODE SELECT" SWITCH IS A MECHANICALLY INTERLOCKED SWITCH. S2A IS SHOWN IN THE ENERGIZED POSITION (PUSHED-IN).
4. S3 IS A MOMENTARY CONTACT SWITCH SHOWN IN ITS NORMAL POSITION.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ± ——
FRACTIONS ± ——
2 PLACE DECIMALS ± ——
3 PLACE DECIMALS ± ——
SURFACE ROUGHNESS √
DO NOT SCALE DRAWING
MATERIAL: ——

APPROVAL	BY	DATE
DRAWN	R Vinson	3/13/69
CHECKED	[illegible]	3/17/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH ——— NAME ——— DATE ——— 19
APPROVED ——— NAME ——— DATE ——— 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

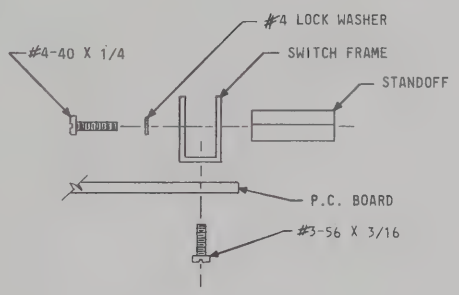
SCHEMATIC DIAGRAM
DISTORTION GATING
DG-2 (TMG-10)

DASH NO	NEXT ASSEMBLY	PROJECT
—1	TP-AD-41816676	676

APPLICATION

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41814676	D LTR
SCALE ——		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED NOTE 2. EN 1374	10/14/71	[illegible]	[illegible]	[illegible]



DETAIL "A"

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

NOTES:
1. ALL D[illegible] PECIFIED [illegible] ICHES.
2. INSTA[illegible] CLEAN[illegible]

APPROVAL	BY	DATE
DRAWN	[illegible]	3/31/69
CHECKED	[illegible]	6/24/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME _____ DATE _____ 19__

APPROVED
NAME _____ DATE _____ 19__

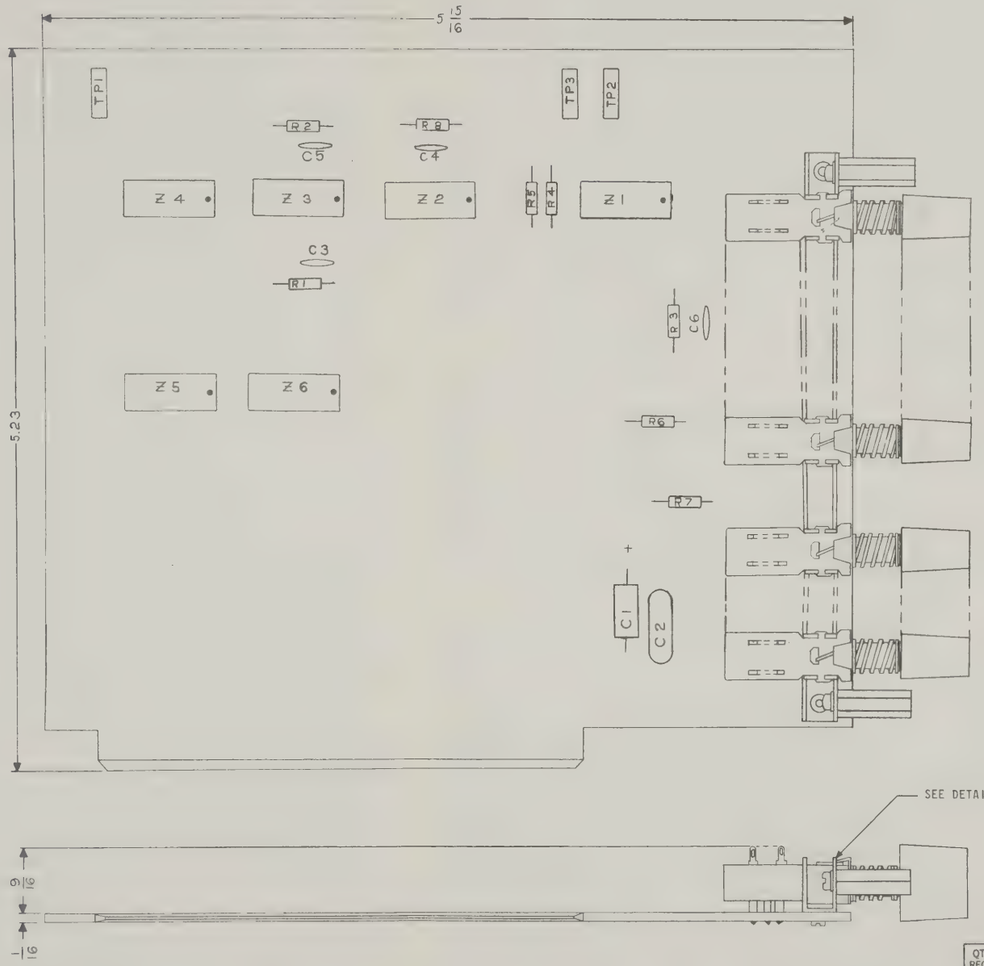
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

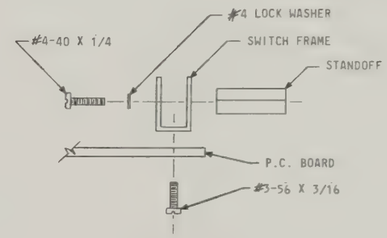
PRINTED CIRCUIT BOARD ASSY
DISTORTION GATING
DG-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41816676	A LTR

SCALE: 2/1 SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED NOTE 2. EN 1374	10/11/71	[illegible]	[illegible]	[illegible]





DETAIL "A"

NOTES:
1. ALL DIMENSIONS ARE REFERENCE.
2. INSTALL SWITCHES AFTER WAVESOLDER AND CLEANING OPERATION.

DASH NO.	NEXT ASSEMBLY	PROJECT
-1	TP-FA-41834676-2	TMG-10
-1	TP-FA-41834676-1	TMG-10

APPLICATION

QTY REQD	PART OR IDENTIFYING NO	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS √

DO NOT SCALE DRAWING

MATERIAL:

APPROVAL	BY	DATE
DRAWN	[illegible]	3/31/69
CHECKED	[illegible]	6/30/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

PRINTED CIRCUIT BOARD ASSY
DISTORTION GATING
DG-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41816676	A LTR

SCALE: 2/1 SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	I.C. #23d WAS 23b DCN #799	1/7/70	SWJ	SWJ	AB

INTERNAL SYNC ← 22

ARM INT/EXT SYNC SWITCH ← 21

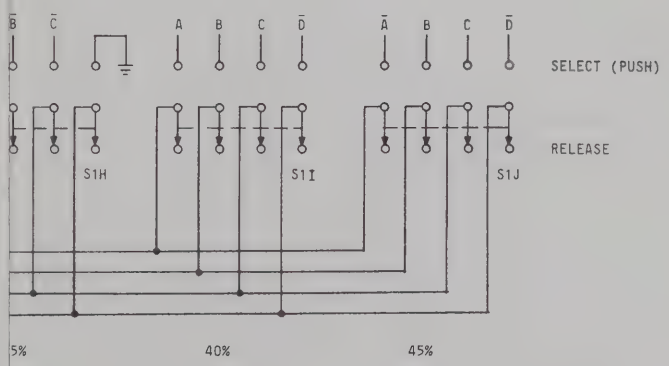
(BC-1,E ; DG-2,5) UP ← E

(DG-2, 2) DOWN ← B

(DG-2,3) SYSTEM RESET ← C

(CS-3,4) 20 PULSE CLOCK ← D

(BC-1,22) 45% ← Z



(DG-2,6) DM ← F

(BUS) +4V ← 1

(BUS) GRD ← A

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

PECIFIED
NCHES.

AWING

APPROVAL	BY	DATE
DRAWN	E Vinson	3/11/69
CHECKED	[illegible]	3/21/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	A Burns	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19

APPROVED
NAME DATE 19

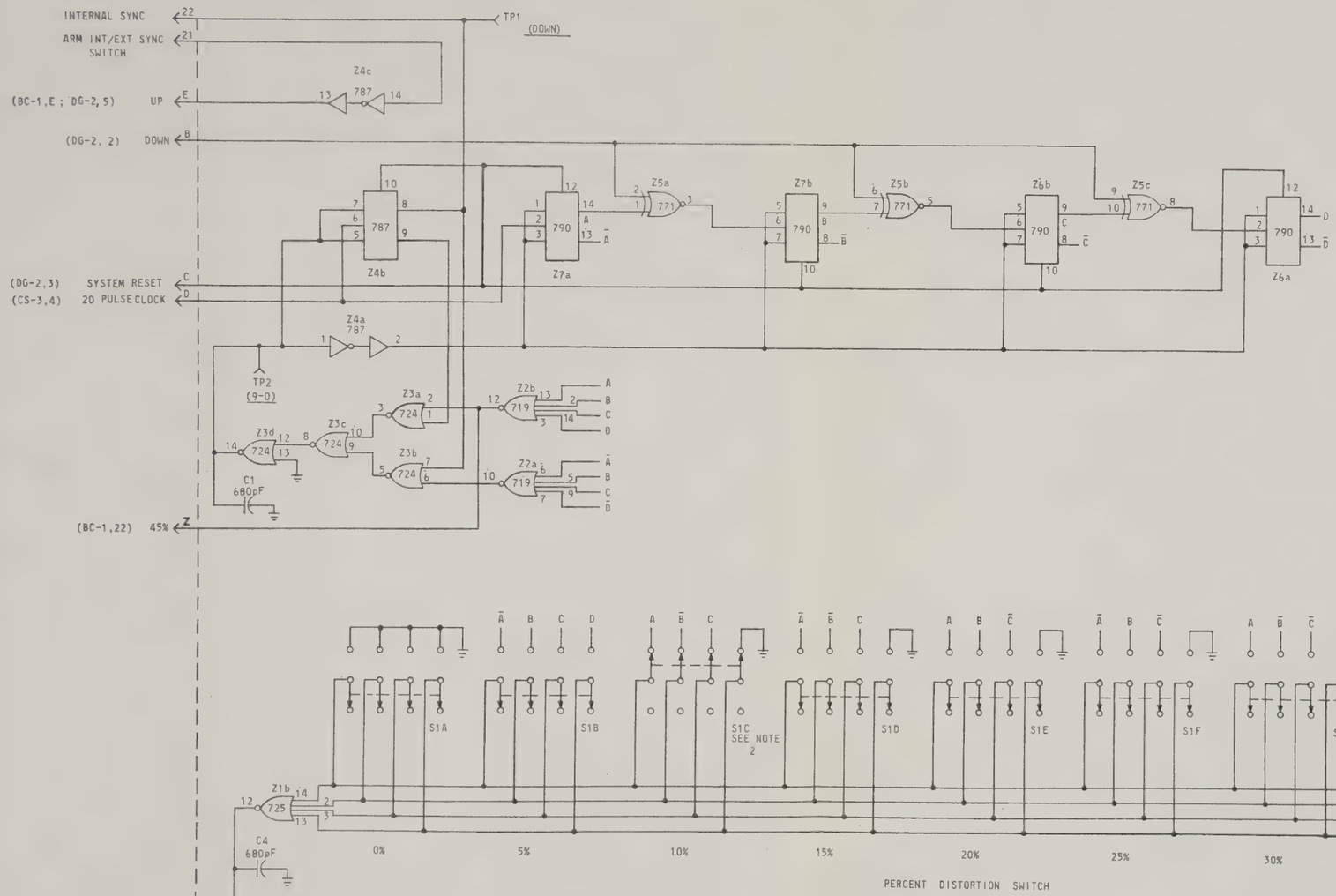
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

SCHEMATIC DIAGRAM
DISTORTION MARKS GENERATOR
DM-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41823676	A LTR

SCALE — SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	I.C #Z3d WAS Z3b DCN #799	1/7/70	SW	SW	AR



NOTES: UNLESS OTHERWISE SPECIFIED:

1. CAPACITOR VALUES ARE IN MICROFARADS.
2. THE PERCENT DISTORTION SWITCH IS A MECHANICALLY INTERLOCKED SWITCH. S1C IS SHOWN IN THE ENERGIZED POSITION (PUSHED IN).

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED	APPROVAL	BY	DATE
DIMENSIONS ARE IN INCHES.	DRAWN	[illegible]	3/11/69
TOLERANCES:	CHECKED	[illegible]	3/21/69
ANGLES ±	ENGRG	[illegible]	7/1/69
FRACTIONS ±	PROJ ENGRG	[illegible]	11-14-69
2 PLACE DECIMALS ±	STRESS		
3 PLACE DECIMALS ±			
SURFACE ROUGHNESS √			
DO NOT SCALE DRAWING	APPROVED FOR ATLANTIC RESEARCH		19
MATERIAL:	APPROVED		19

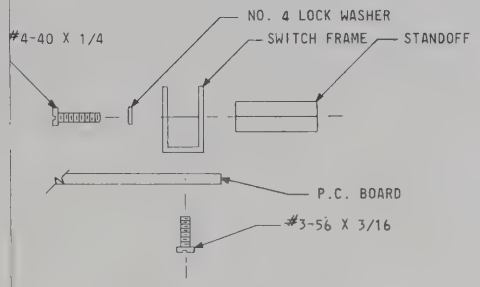
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

SCHEMATIC DIAGRAM
DISTORTION MARKS GENERATOR
DM-2 (TMG-10)

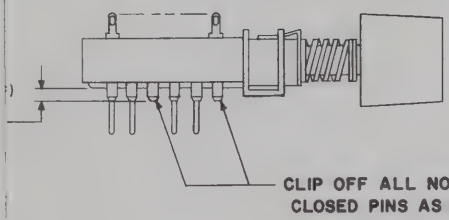
DASH NO.	NEXT ASSEMBLY	PROJECT
-1	TP-AD-41816676	676
APPLICATION		

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41823676	A LTR
SCALE —		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED NOTE 2. EN 1374	10/11/71	EV		



DETAIL "A"



DETAIL "B"

NOTES:
1. ALL DIMENSION
2. INSTALL SWIT
AND CLEANING

ITEM	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

APPROVAL	BY	DATE
DRAWN	E. Vinson	3/28/69
CHECKED	[illegible]	6/24/[illegible]
ENGRG	[illegible]	7/1/[illegible]
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

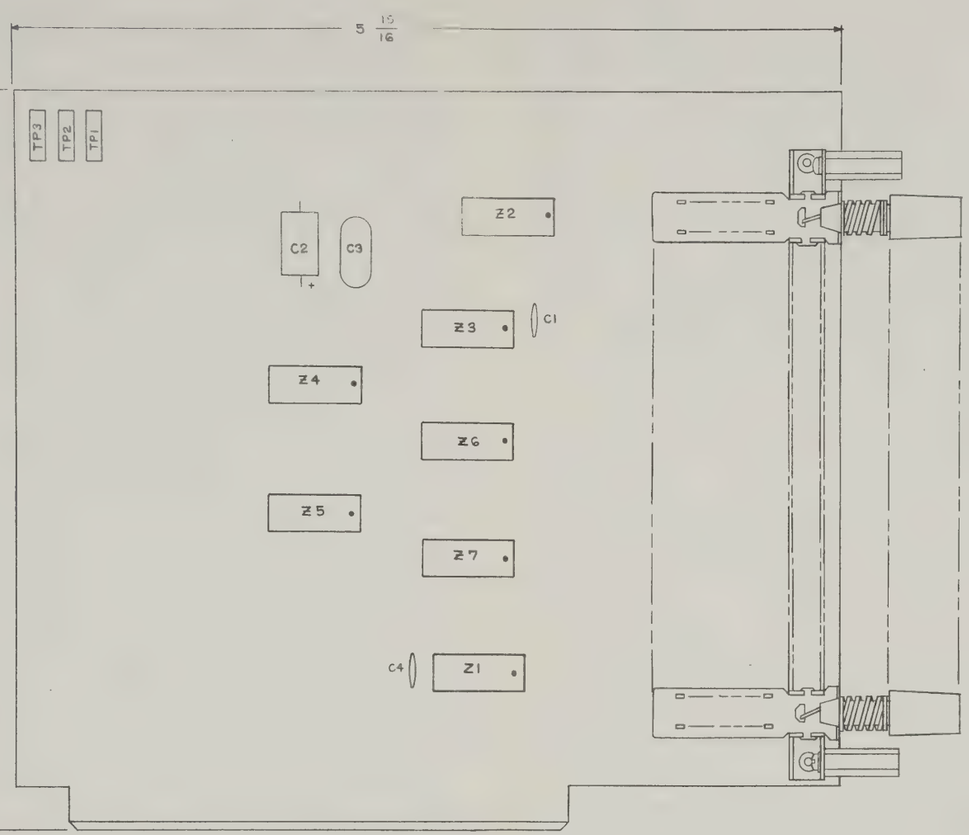
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

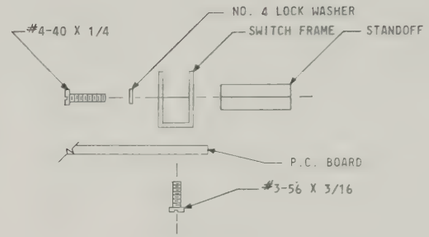
PRINTED CIRCUIT BOARD ASS'Y
DISTORTION MARKS GENERATOR
DM-2 (TMG-10.)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41825676	A LTR

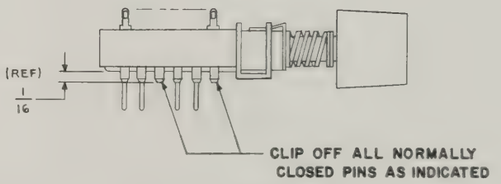
SCALE : 2/1 SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED NOTE 2. EN 1374	10/11/71	[illegible]	[illegible]	[illegible]

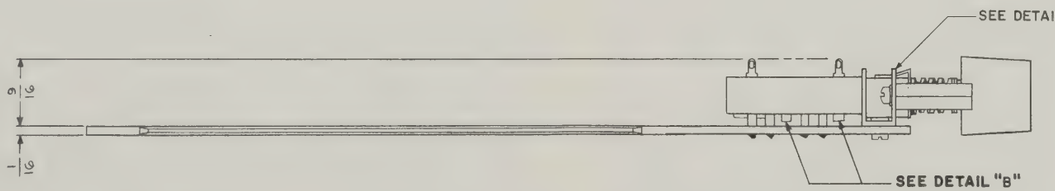




DETAIL "A"



DETAIL "B"



NOTES:
1. ALL DIMENSIONS ARE REFERENCE.
2. INSTALL SWITCHES AFTER WAVESOLDER AND CLEANING OPERATION.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER
-1	TP-FA-41834676-2	TMG-10			
-1	TP-FA-41834676-1	TMG-10			

LIST OF MATERIALS OR PARTS LIST

DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ± ——
FRACTIONS ± ——
2 PLACE DECIMALS ± ——
3 PLACE DECIMALS ± ——
SURFACE ROUGHNESS √
DO NOT SCALE DRAWING
MATERIAL: ——

APPROVAL	BY	DATE
DRAWN	E. Pilvinson	3/24/69
CHECKED	W.F.B.	6/24/[illegible]
ENGRG	[illegible]	7/1/[illegible]
PROJ ENGRG	[illegible]	11-14-69
STRESS		

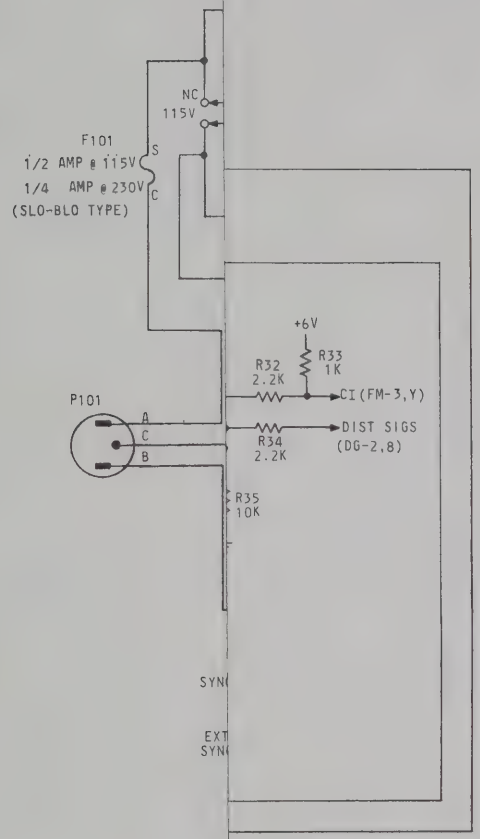
APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT
A DIVISION OF THE SUSQUEHANNA CORP
ALEXANDRIA, VIRGINIA 22314

PRINTED CIRCUIT BOARD ASS'Y
DISTORTION MARKS GENERATOR DM-2 (TMG-10.)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41825676	A LTR
SCALE: 2/1			SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CIRCUIT REVISED. R21 WAS 10K. R26 WAS 2.2K. Q8,Q11,Q13 & Q14 WERE 2N3567. DCN 799.	1/7/70			
B	CR1 WAS 1N5235. R16 & R19 WAS 1/4W. EN'S 941,991	5-22-70	E.V.		
C	REVERSED PIN NOS. OF T1; 1 WITH 5 AND 2 WITH 6. ADDED C6 EN 1429	10-13-71			
D	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE		
E	UPDATE FOR OS-2. EN 2452	4-3-74		PES	



-SA-41833676)

NOTES:

1. UNLESS OTHERWISE SPEC
   - A. RESISTANCE VALU
   - B. CAPACITANCE VAL
   - C. BRIDGE RECTIFIE
   - D. TRANSFORMER, T1 NO. PE-6447.
2. J203 AND J204 ARE INS
3. MIL-188 SHAPING OPTIO INSTALLED BY USER.

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

SPECIFIED
NCHES.

AWING

APPROVAL	BY	DATE
DRAWN	E Vinson	3/24/69
CHECKED		6/24/69
ENGRG		7/1/69
PROJ ENGRG	Required	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19__

APPROVED
NAME DATE 19__

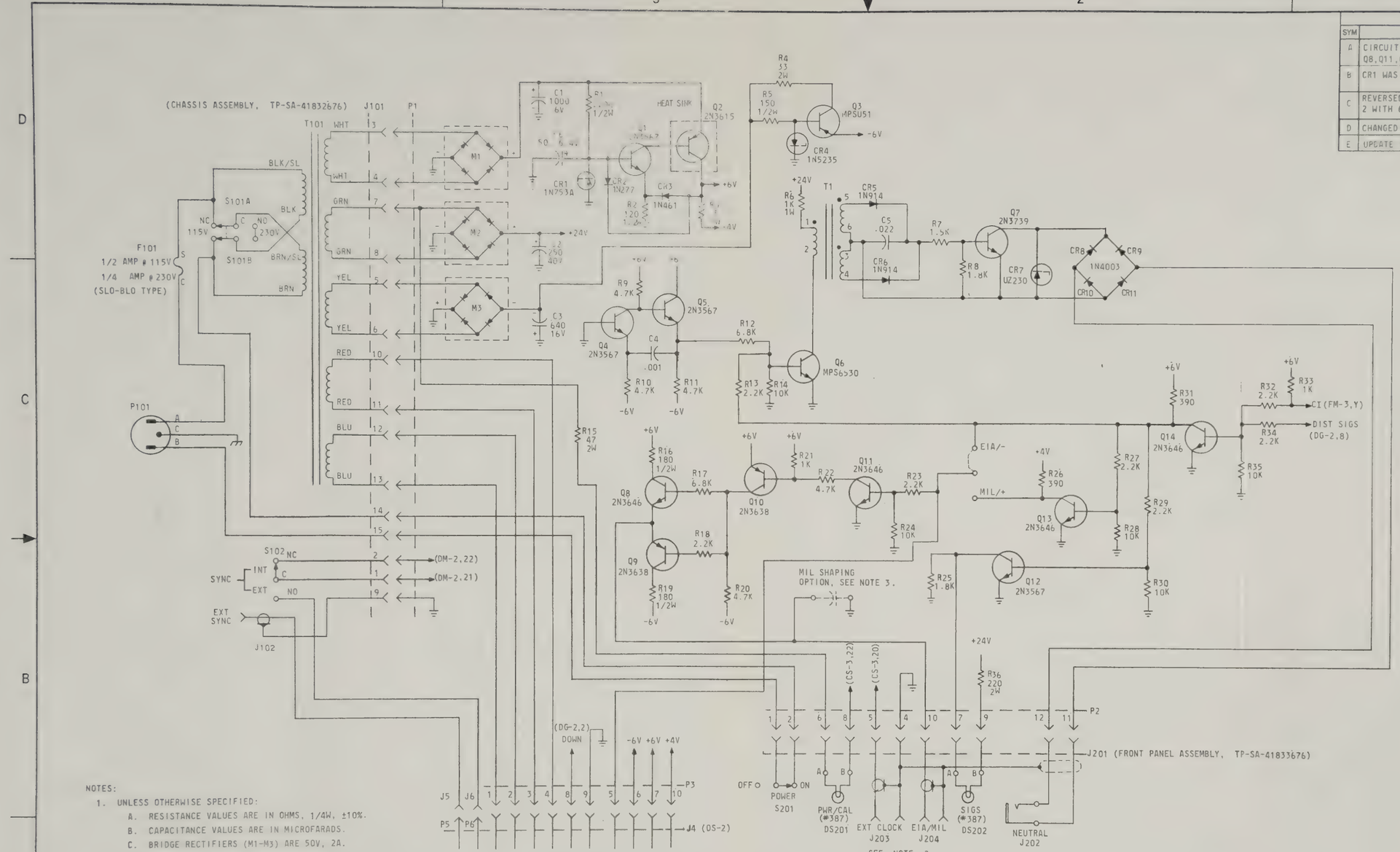
ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

SCHEMATIC DIAGRAM
POWER SUPPLY - MOTHER BOARD
PS-MB (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41826676	E LTR

SCALE ——— SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CIRCUIT REVISED. R21 WAS 10K. R26 WAS 2.2K. Q8,Q11,Q13 & Q14 WERE 2N3567. DCN 799.	1/1/70			
B	CR1 WAS 1N5235, R16 & R19 WAS 1/4W. EN'S 941,991	5-22-70	E.V.		
C	REVERSED PIN NOS. OF T1; 1 WITH 5 AND 2 WITH 6. ADDED C6 EN 1429	10-13-71			
D	CHANGED FM-2 TO FM-3. EN 2357	10-8-73	ALE		
E	UPDATE FOR OS-2. EN 2452	4-3-74			



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A. RESISTANCE VALUES ARE IN OHMS, 1/4W, ±10%.
   - B. CAPACITANCE VALUES ARE IN MICROFARADS.
   - C. BRIDGE RECTIFIERS (M1-M3) ARE 50V, 2A.
   - D. TRANSFORMER, T1, IS PULSE ENGINEERING INC. PART NO. PE-6447.
2. J203 AND J204 ARE INSULATED FROM THE CHASSIS.
3. MIL-188 SHAPING OPTION; VALUE DETERMINED BY SPEED; INSTALLED BY USER.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS

DO NOT SCALE DRAWING

MATERIAL:

APPROVAL	BY	DATE
DRAWN		3/25/69
CHECKED		
ENGRG		
PROJ ENGRG		11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA - 22314

SCHEMATIC DIAGRAM
POWER SUPPLY - MOTHER BOARD
PS-MB (TMG-10)

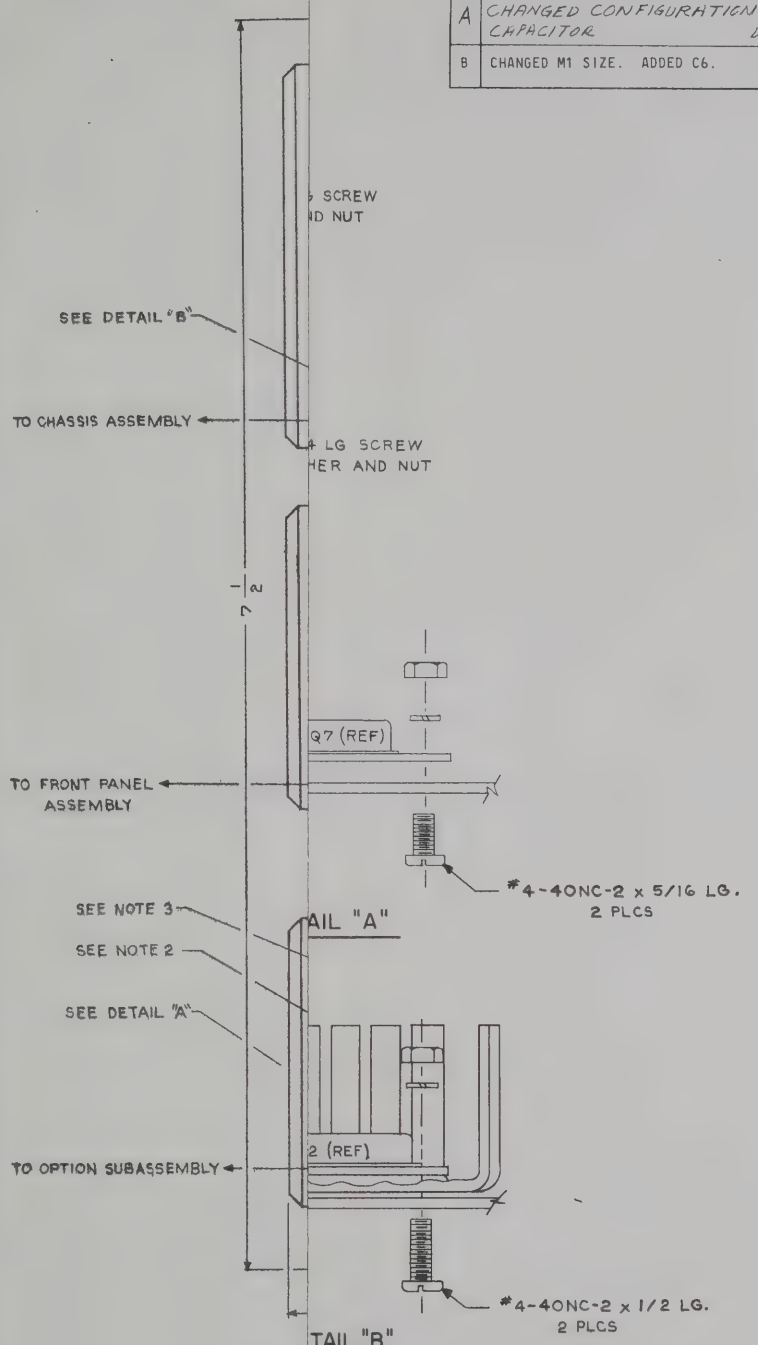
CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-41826676	E LTR

SCALE
SHEET 1 OF 1

DASH NO.	NEXT ASSEMBLY	PROJECT
-1	TP-AD-41828676	676

APPLICATION

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED CONFIGURATION OPTION CAPACITOR DCN 799	1-7-70	P.E.S.		
B	CHANGED M1 SIZE. ADDED C6. EN 1167	10/14/71			



ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

APPROVAL	BY	DATE
DRAWN	[illegible]	4/9/69
CHECKED	[illegible]	6/24/69
ENGRG	W. Hanson	1/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

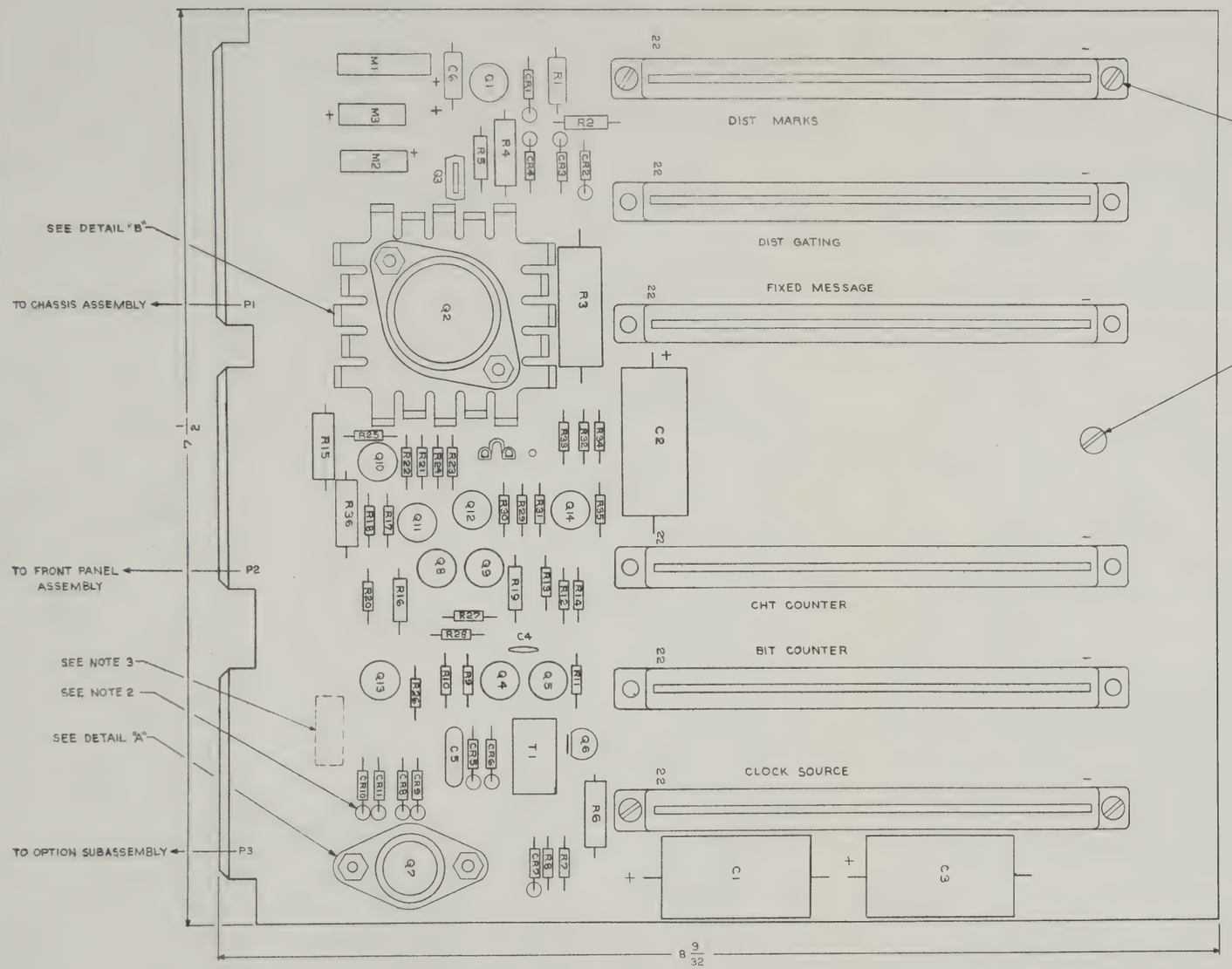
APPROVED FOR ATLANTIC RESEARCH
NAME _____ DATE _____ 19__
APPROVED
NAME _____ DATE _____ 19__

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

PRINTED CIRCUIT BOARD ASS'Y
POWER SUPPLY – MOTHER BOARD
PS-MB (TMG-10)

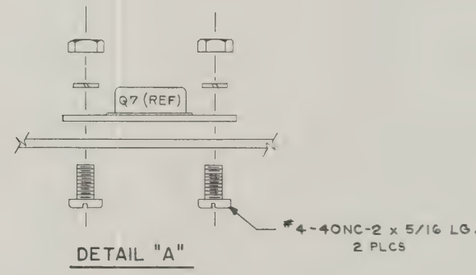
CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41828676	B LTR
SCALE 2/1		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	CHANGED CONFIGURATION OPTION CAPACITOR DCN 799	1-7-70	P.E.S.		
B	CHANGED M1 SIZE. ADDED C6. EN 1167	10/1/71			

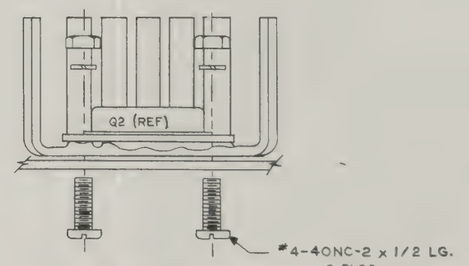


#4-40NC-2 x 1/2 LG SCREW WITH LOCKWASHER AND NUT TYP 4 PLCS

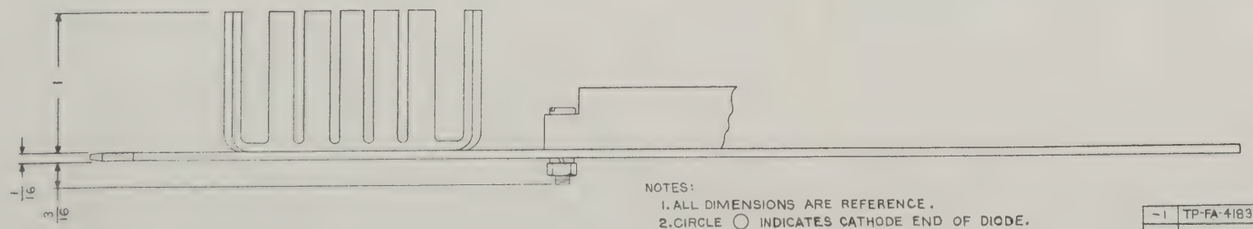
#4-40NC-2 x 1/4 LG SCREW WITH LOCKWASHER AND NUT



DETAIL "A"



DETAIL "B"



NOTES:
1. ALL DIMENSIONS ARE REFERENCE.
2. CIRCLE ○ INDICATES CATHODE END OF DIODE.
3. MIL SHAPE OPTION CAPACITOR.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER
LIST OF MATERIALS OR PARTS LIST					
-1	TP-FA-41834676-2		676		
-1	TP-FA-41834676-1		676		

DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES:
ANGLES ±
FRACTIONS ±
2 PLACE DECIMALS ±
3 PLACE DECIMALS ±
SURFACE ROUGHNESS

DO NOT SCALE DRAWING

MATERIAL:

APPROVAL	BY	DATE
DRAWN	[illegible]	4/9/69
CHECKED	[illegible]	6/24/69
ENGRG	[illegible]	7/1/69
PROJ ENGRG	[illegible]	11-14-69
STRESS		

APPROVED FOR ATLANTIC RESEARCH
NAME DATE 19
APPROVED
NAME DATE 19

ATLANTIC RESEARCH CORPORATION
TELEPRODUCTS DEPT.
A DIVISION OF THE SUSQUEHANNA CORP.
ALEXANDRIA, VIRGINIA – 22314

PRINTED CIRCUIT BOARD ASS'Y
POWER SUPPLY – MOTHER BOARD
PS-MB (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-41828676	B LTR
SCALE 2/1			SHEET 1 OF 1

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD

60V AC RMS

2

J1

TIP NEG (-)

60V AC RMS

WET NEUT/POLAR OUT

+6

PS/MB, EIA/MI SELECT TERMINAL SIG

COMMO

J2 INT. CLOCK OUT EIA

(DG-2-2) DO

J3 LOGIC OUT

-6

+4

(TO J102) EXT SYN

(TO S102 N.O.) INV EX SYNC OU

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A. ALL RESISTANCE VALUES ARE IN OHMS, ±10%, 1/4W.
   - B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
2. TRANSISTOR Q9 IS A SPECIAL TESTED 2N3638 PER ARC DWG. TP-TS-21756640.

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

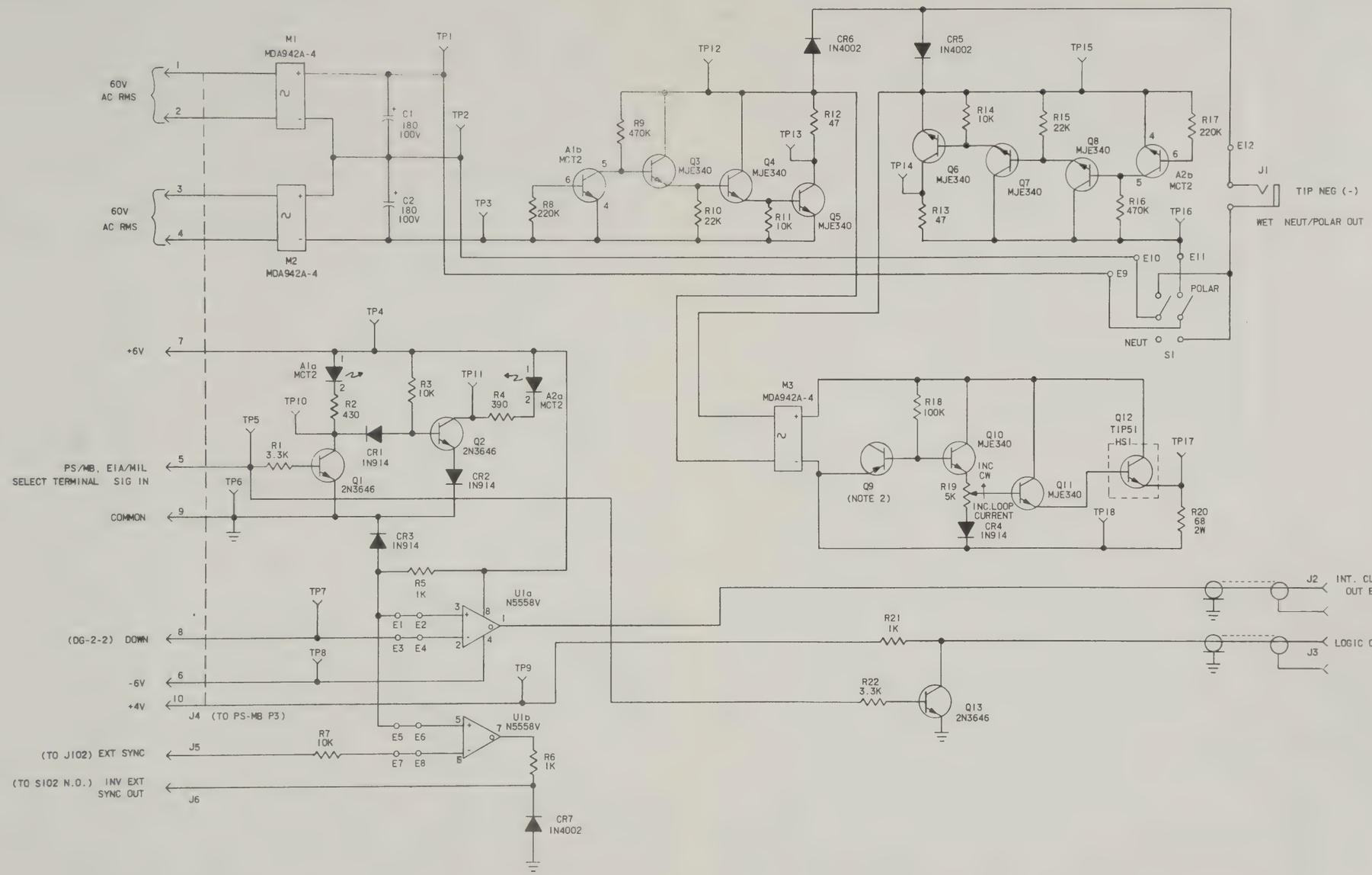
SPECIFIED	APPROVAL	BY	DATE
INCHES	DRAWN	AL. E.	10-31-73
—	CHECKED		11-20-73
—	ENGRG		11-30-73
—	PROJ ENGRG		11-30-73
√	APPROVED FOR ATLANTIC RESEARCH		
WING	NAME	DATE	19
	APPROVED		
	NAME	DATE	19

ATLANTIC RESEARCH CORPORATION
ALEXANDRIA VIRGINIA 22314

SCHEMATIC DIAGRAM
OPTION SUBASSEMBLY
OS-2 SERIES "A"

CODE IDENT NO.	SIZE		REV
95335	D	TP-SD-42632802	—
SCALE: —		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   - A. ALL RESISTANCE VALUES ARE IN OHMS, ±10%, 1/4W.
   - B. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
2. TRANSISTOR Q9 IS A SPECIAL TESTED 2N3638 PER ARC DWG. TP-TS-21756640.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

UNLESS OTHERWISE SPECIFIED	APPROVAL	BY	DATE
DIMENSIONS ARE IN INCHES	DRAWN	AL E.	10-31-73
TOLERANCES: ANGLES ± —	CHECKED		11-30-73
FRACTIONS ± —	ENGRG		11-30-73
2 PLACE DECIMALS ± —	PROJ ENGRG		11-30-73
3 PLACE DECIMALS ± —	APPROVED FOR ATLANTIC RESEARCH		
SURFACE ROUGHNESS √	NAME	DATE	19—
DO NOT SCALE DRAWING	APPROVED		
MATERIAL: —	NAME	DATE	19—

ATLANTIC RESEARCH CORPORATION
ALEXANDRIA VIRGINIA 22314

SCHEMATIC DIAGRAM
OPTION SUBASSEMBLY
OS-2 SERIES "A"

DASH NO.	NEXT ASSEMBLY	PROJECT
	APPLICATION	

CODE IDENT NO.	SIZE	TP-SD-42632802	REV
95335	D		—
SCALE: —		SHEET 1 OF 1	

REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED J5 & J6 PINS. EN 2452	4-3-74	[illegible]	PBS	[illegible]

SEE DETAIL "A"

.44L

5.59

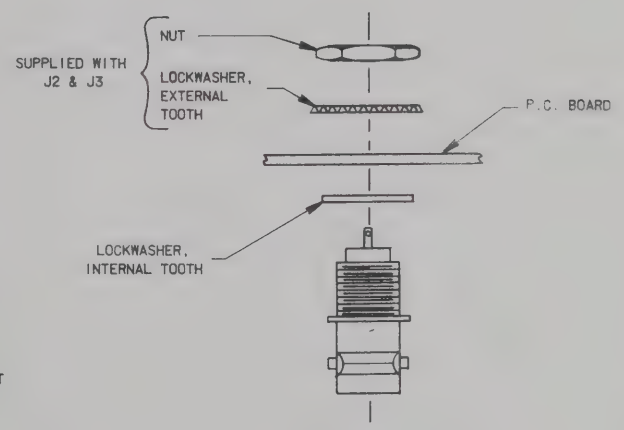
SEE NOTE 3

ARD

ING NUT

NOTES:

1. ALL DIMENSIONS ARE REFERENCE.
2. CIRCLE ○ INDICATES CATHODE END OF DIODE.
3. METAL SIDE OF TRANSISTOR MUST FACE REFERENCE LINE ON P.C. BOARD.
4. USE MOUNTING HARDWARE SUPPLIED WITH J1, J2, J3, & S1.



DETAIL "C"

TYP. MTG. FOR J2 & J3

ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

CIFIED
HES
NG

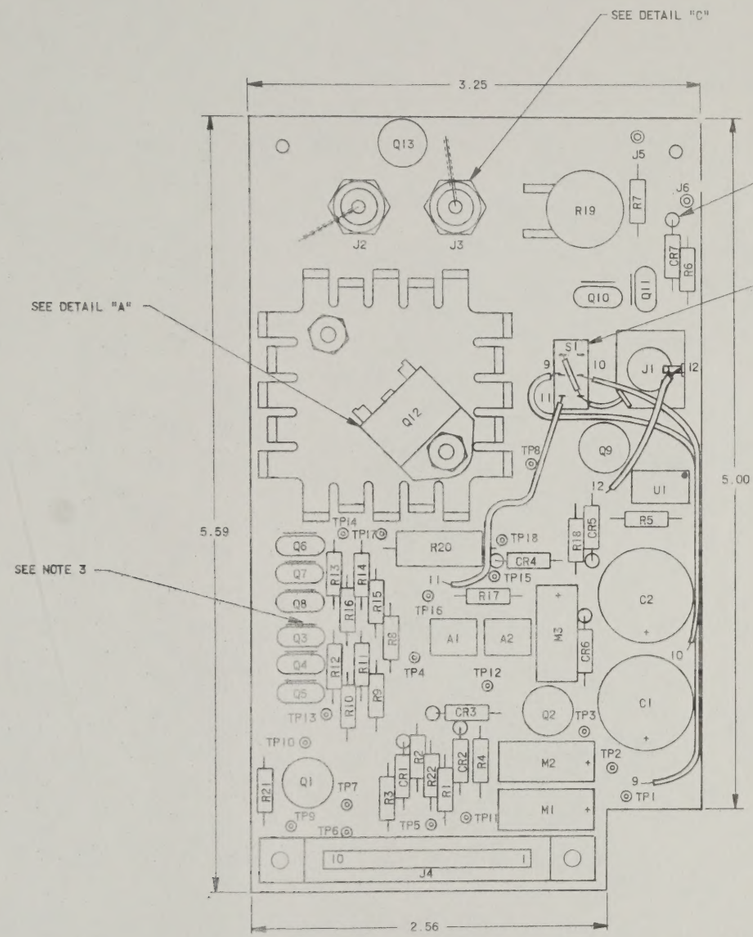
APPROVAL	BY	DATE
DRAWN	T. Sweeney	11-26-73
CHECKED	[illegible]	11-29-73
ENGRG	[illegible]	11-30-73
PROJ ENGRG	[illegible]	11-30-73
APPROVED FOR ATLANTIC RESEARCH		
NAME	DATE	19
APPROVED		
NAME	DATE	19

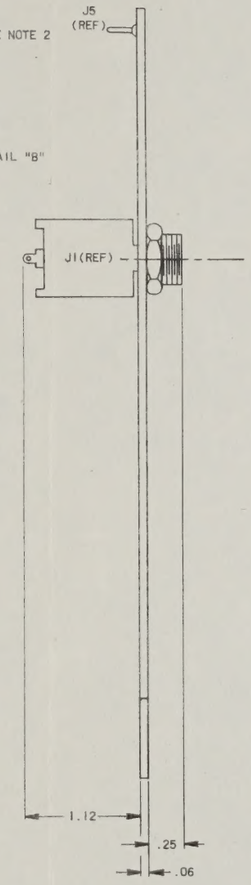
ATLANTIC RESEARCH CORPORATION
ALEXANDRIA VIRGINIA 22314

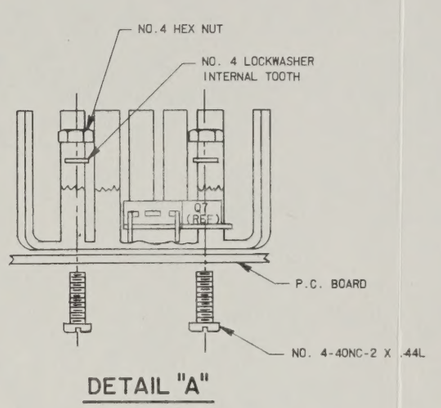
PRINTED CIRCUIT BOARD ASSY OPTION SUBASSEMBLY
OS-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-42633802	A
SCALE: 2/1		SHEET 1 OF 1	

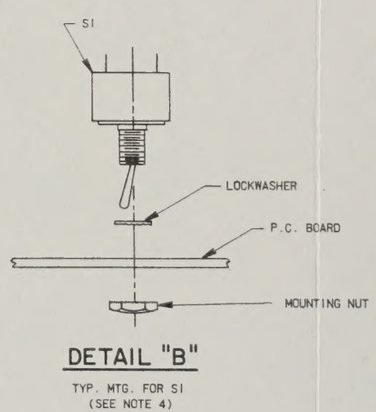
REVISIONS					
SYM	DESCRIPTION	DATE	BY	CHK	APPD
A	ADDED J5 & J6 PINS. EN 2452	4-3-74	AL	PBS	WCH





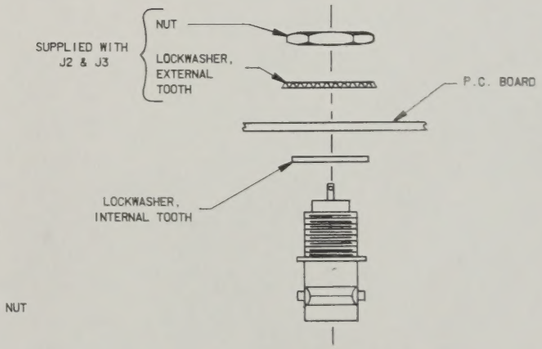


DETAIL "A"



DETAIL "B"

TYP. MTG. FOR S1
(SEE NOTE 4)



DETAIL "C"

TYP. MTG. FOR J2 & J3

NOTES:

1. ALL DIMENSIONS ARE REFERENCE.
2. CIRCLE ○ INDICATES CATHODE END OF DIODE.
3. METAL SIDE OF TRANSISTOR MUST FACE REFERENCE LINE ON P.C. BOARD.
4. USE MOUNTING HARDWARE SUPPLIED WITH J1, J2, J3, & S1.

QTY REQD	PART OR IDENTIFYING NO.	ITEM NO.	DESCRIPTION	REF DESIG	MANUFACTURER

LIST OF MATERIALS OR PARTS LIST

DASH NO.	NEXT ASSEMBLY	PROJECT
APPLICATION		

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES ± —
FRACTIONS ± —
2 PLACE DECIMALS ± —
3 PLACE DECIMALS ± .005
SURFACE ROUGHNESS √
DO NOT SCALE DRAWING
MATERIAL: —

APPROVAL	BY	DATE
DRAWN	T.Sweeney	11-26-73
CHECKED		11-29-73
ENGRG		11-30-73
PROJ ENGRG		11-30-73
APPROVED FOR ATLANTIC RESEARCH		
NAME	DATE	19
APPROVED		
NAME	DATE	19

ATLANTIC RESEARCH CORPORATION
ALEXANDRIA, VIRGINIA 22314

PRINTED CIRCUIT BOARD ASSY OPTION SUBASSEMBLY OS-2 (TMG-10)

CODE IDENT NO.	SIZE		REV
95335	D	TP-AD-42633802	A
SCALE: 2/1		SHEET 1 OF 1	